THE ENGINEERING AND MINING JOURNAL.

RICHARD P. ROTHWELL, C. E., M. E.
ROSSITER W. RAYMOND, Ph. D. } Editors.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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"THE ENGINEERING AND MINING JOURNAL" ADVOCATES THE ADOPTION OF THE METRIC SYSTEM OF WEIGHTS AND MEASURES,

and urges all who are interested in the simplification of our present complicated and unsatisfactory systems to aid, by their active sympathy and encouragement, the early introduction of this much-needed reform.

THE REVIVAL OF BUSINESS.

There are unmistakable signs of a general improvement in business throughout the country, though prices are still declining in many articles. The cost of production has declined more rapidly than the selling prices, and the profits on manufactures are consequently greater than when higher prices were obtained for the products. The improvement in business has naturally come first to the West, but it is also felt in all parts of the East, where our growing export business is a most encouraging feature. Though prices of most of the articles of export were much less in the year 1876 than in 1875, yet the value of our exports had increased from $567,011,818 in 1875, to $637,452,168 in 1876, as reported by the Bureau of Statistics.

In the coal trade we note a large increase in consumption, but prices are so low as to involve losses to the business, even with the heavy reduction in wages recently made. There is much distress among the miners throughout the anthracite regions, due to the lack of steady employment rather than the low wages, for there is no doubt the men, if they could be guaranteed steady work at present wages, would be better off than with half work at the old rates. The remedies will be found in the exodus of miners which has been going on for some time past, and in the increased consumption of coal, which will soon afford steady work to those who remain. While the coal companies have still much trouble to go through, we believe relief is not far distant, and the policy which seeks safety in fostering and extending trade rather than in exacting high profits on a restricted business, will bring permanent prosperity at an earlier day than many anticipate.

COMPANIES' REPORTS.

We have received numerous communications approving our criticism of the coal companies' manner of making reports, and showing the need there is of improvement in this particular. The general distrust of companies in which the management ignore this plain duty is growing apace, and, as a consequence, we see the stocks rapidly declining in the market, notwithstanding the efforts of powerful cliques of interested "bulls." The directors are therefore doing a great injury to the majority of their stockholders, and are alone responsible for the ruin their course has brought, or is bringing, on those who trusted them. As a sample of the letters received on this subject, we give the following from a gentleman in New Orleans; it is dated March 15:

TO THE EDITOR: SIR—I note with satisfaction your strictures on the coal companies, and emphatically agree with you in the opinion that their reports are practically worthless to the average stockholders, particularly to those who reside at a distance and are compelled to rely upon them for information.

I have to complain especially of the Delaware, Lackawanna & Western Railroad Company, in which I have the misfortune to be interested, as you will perceive from the inclosed letter, the original of which was posted to Mr. Sloan Feb. 20, 1877. I regret being compelled to add that that gentleman has not yet favored me with a reply; he has not even sent me a copy of his last report, meagre as it is. I will not quote or rehearse the questions to Mr. Sloan in this letter; it speaks for itself.

I have stated the simple facts in plain but courteous language. I willingly submit the question to you, Mr. Editor, as to whether a polite inquiry of this nature (under all the surrounding circumstances of panic and apprehension) is not entitled to a reply?

I freely confess that my confidence in the Delaware, Lackawanna & Western Railroad Company was unshaken until I read this late report(?), coupled with the fact that my personal application to the President remained unnoticed. Now I am ready to expect the worst.

You are at liberty to make any use you please of this and the inclosed letter.

The letter here referred to states that the writer, in February 1876, purchased for his wife's account 300 shares of Delaware, Lackawanna & Western stock at 118⅜, and in August of the same year 300 more at 95⅜, and seeing the stock quoted about a month ago at 65, and being naturally anxious for the safety of his wife's property, he wrote to the President of the company for some assurance as to its condition and the probability of an early resumption of dividends.

Had the company's report contained the information it should have done, these questions would have been unnecessary, but in the absence of such a report the stockholder naturally seeks the information from the President (who is merely the employé of the stockholders). Not being able to obtain any information there, the newspapers are resorted to. That the solvency of a company that refuses to make public an intelligible statement of its financial condition should be questioned, is quite natural, and has been fully justified by recent as well as historic events, and, without special application to any company, we consider it no more than ordinary prudence on the part of those having money to invest to avoid the securities of companies that neglect or refuse to make public full and accurate reports of their business.

We go further than this, and believe it highly desirable that all companies should be obliged by law to make annually such full and reliable reports, and we would make the directors criminally responsible to stockholders for neglect to make such reports or for erroneous statements contained therein. Till some such responsibility is imposed by law upon the officers of mining, railroad, and other public companies we shall have frequent financial disasters brought about through lack of ability, errors of judgment, or other causes, with which every one is familiar.

THE SEATON CONSOLIDATED GOLD AND SILVER MINE.

The growth of interest in mining investments which we have noticed during the past few weeks is still very apparent, and appears to be based on more solid foundation than the artificial stimulus of mere stock speculation. The fact that some really good mines have been put upon the Board, and that there is a reasonable prospect of receiving dividends in the near future, is attracting the attention of capitalists, and there are strong indications of a return to mines as the favorite investment in this financial centre.

Mining properties, when selected with that skill, knowledge and prudence that should govern all investments of capital, are undoubtedly far more profitable than those which have for many years past absorbed most of the attention of our moneyed men. The one essential in securing this desirable interest in mining investments is that dealings should be confined to profitable mines, and that facilities should be offered to persons of moderate means to secure an interest in such concerns. The organization of companies (owning valuable dividend paying mines) under the laws of New York, by which the liability of stockholders is limited to the par value of their stock, and in which assessments cannot be levied on fully paid stock, will give confidence to investors; and the division of capital into shares of small value will enable persons of even the smallest means to take an interest. This, of course, has also its objectionable features, for when the amount to be invested is small, it certainly induces a spirit of wild speculation or gambling in stocks, and the mysteries and uncertainties of mining are also conditions that encourage this mischievous spirit.

The new Mining Stock Boards of this city seem to have a growing appreciation of the importance of dealing in good mines only, and for some weeks past the transactions have been confined to a few mines which have a good record and offer reasonable certainty of regular dividends.

We have taken steps to secure regular and reliable correspondence by experts from the various fields in which valuable mines may be developed, so as to place within the reach of all information of a trustworthy character with regard to the prospects of mines whose securities are offered for sale. The information we shall give is not intended to take the place of personal inquiry and investigation, which every investor should make before parting with his money, but, on the contrary, is intended to provoke and facilitate such investigation.

We have great pleasure in commencing our illustrations of mines with that of the Seaton Consolidated Mining Company's property. This company has been incorporated under the laws of New York with a capital stock of $500,000, in 50,000 shares of $10 each. These are issued fully paid up, and are unassessable. The following particulars concerning this property are taken from a prospectus just issued by the company:

"The property is one of the largest and most valuable mining estates in Colorado. It consists of 1,600 feet of the celebrated Seaton vein, in Idaho Mining District, Clear Creek County, Colorado. The Seaton Mine, from its discovery, has been known throughout Colorado as one of the largest producing true fissure veins ever discovered in the state.

"The entire amount of ore taken from the vein up to the present year aggregates 3,260 tons, of which returns are had of 2,849 tons assorted ore. Of this amount of ore about 1,450 tons were worked by the old stamp-mill process exclusively for gold, yielding $83,720, or an average of $57 per ton. The remaining 1,399 tons have been sold to smelting works, yielding an average value of $80 per ton, net, or $112,110, giving a total product of $195,830. The work in the mine for the past two years has been chiefly devoted to development—sinking shafts, running tunnels, drifts, levels, and exposing the vast mineral resources of the vein. The prospective value of the Seaton Mine, estimated from a careful underground measurement of the blocks of ore, containing the "ore in sight" [as shown by the sectional map on the supplement sheet given herewith] is as follows:

"The said blocks contain 3,194 tons of ore, at, say $80 average per ton (being the average of upwards of 2,000 tons sold): or a value of "ore in sight" amounting to $255,440.

"These blocks can be mined out during the next two years, which will give ample time for the completion of a tunnel, now in 200 feet, that will intersect the vein 600 feet below the surface, and open up, it is expected, a much larger and richer body of ore than has yet been found in the mine. Engineers estimate the vein to contain at

that depth, within an area of 338x500 feet, an ore value of $1,216,800, or 12,168 tons of ore at $100 per ton.

"The cost of mining, dressing, hauling and smelting the ore has not exceeded 40 per cent. of the ore value, and upon the completion of the deep tunnel a much smaller ratio of expense will be incurred."

These statements are confirmed by a number of mining experts, extracts from whose reports are contained in the prospectus. We have also had favorable reports of this property from our own correspondents, and there seems every prospect of the company being able to earn regular and large dividends.

During the first eighteen days of this month, eighty tons of ore was produced by a force of thirty men, and sold, we are informed by the officers of the company, for $8,000. The expenses are estimated at 40 per cent., so that the mine has produced already this month (March) the amount necessary for a dividend of one per cent., which, it is stated, will be declared on the 31st inst. A regular monthly dividend of from one to two per cent. is promised, and, with energetic management, should be obtained. It is to be hoped, however, that the company will not sacrifice the permanent prosperity of the mine to the desire to declare large monthly dividends, but push the exploration works and increase rather than diminish the amount of reserves in the mine and in the bank; in this manner we may hope to have the pleasure of recording on many future occasions our satisfaction that so valuable a property has been placed upon our new Board. With a regular dividend of 12 per cent. a year the stock would probably command par in the market, while at present it is quoted at about 50 cents on the dollar, or, in other words, the present market value of the stock is about equal to the estimated value of the ore in sight.

Seaton was one of the first valuable mines quoted on the Mining Board, and it promises to become one of the most popular. At present the transactions in the stock are large, and are participated in by capitalists who seek a remunerative and safe investment.

MR. WEEKS JUSTIFIES HIMSELF.

We have received the following letter from Mr. Weeks, of the *Iron Age:*

TO THE EDITOR—SIR: I was somewhat surprised, upon having my attention called to your article in the last issue of the ENGINEERING AND MINING JOURNAL, to find that, in replying to an editorial in the *Iron Age* of the 8th inst., you had made me the object of a personal attack. The basis of this attack is the publication in the *Iron Age* of Mr. Bell's paper read at the June meeting of the Institute, and the circumstances connected therewith. As these circumstances have been in a number of instances grossly, though I do not charge wilfully, misrepresented, I wish to say that for the opportunity of publishing that paper or any part of it, or for the possession of the manuscript, or for the privilege of copying it, I am under no obligation to any officer of the Institute, nor was I, as representative of the *Iron Age*, responsible to them or any officer for the use I made of the manuscript or the copy made from it. The manuscript did not come into my possession from or through any officer, or by their courtesy or permission, but from Mr. Bell, who gave me his consent to copy, to whom I returned it, and to whom alone I am responsible. The Secretary, after consultation with yourself, refused me permission to use it as I had previous papers, and before it had come into his possession I used it and returned it to Mr. Bell, not to the Secretary. Had I obtained the paper from the Secretary, or through him or by his consent, I would have been under some responsibility to him; but as I did not, there could have been no "clear understanding" violated, in fact I could have had no understanding as to what use I should make of this particular paper.

Regarding your intimation that my action in the matter of the Bell paper was the result of the decision of the Council refusing the offer of the *Iron Age* to print the proceedings of the Institute, I have only to say that this decision was not known to me until long after the Bell paper was published, and my recollection is that it was after such publication that the Council took this action.

A large part of the report of the Washington and Philadelphia meetings was made from manuscript notes, the report of nearly all the discussions having been made in this way, and a large part of the papers read, and not from the papers furnished me by the Secretary, though in making this statement I have no wish to deny the many obligations I am under to Prof. Drown.

Regarding your charge of obtaining copies of papers "surreptitiously," I have only to say this is not so. Every paper we have published in full we have received directly from the author, with the full knowledge that it was to be published by us, at our convenience. As the parties furnishing us with these papers were members of the Institute, if there was anything "surreptitious," they were each "*particeps criminis.*" How they relish such a charge is for them to determine.

Trusting to your courtesy to give this a place in your columns,

I am, respectfully,

PITTSBURG, March 21. JOSEPH D. WEEKS, Associate Editor.

We give Mr. WEEKS the full benefit of his statement of the case, and decline to discuss with him what constitutes an "understanding," or a "surreptitious" evasion of it. Our ideas on these points are irreconcilably opposed to his.

The *Iron Age* of this week very handsomely retracts a portion of its erroneous statements concerning the management of the Institute. We have no doubt it will be convinced, in time, of the courtesy and fair-play which not only the Institute but the ENGINEERING AND MINING JOURNAL is ready to extend to it. Meanwhile, it is due to all parties to point out that with the charges which the *Iron Age* so promptly and fully retracts, all the inferences which it built upon them fall to the ground, and the way is clear for a fair discussion of the best way to publish the proceedings of such a society as the Institute. We beg the *Iron Age*, if it is still dissatisfied with the present system, to suggest a complete n which it deems better.

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REFRACTORY PRODUCTS AT THE PHILADELPHIA EXHIBITION.

(Concluded from Page 136.)

Special Correspondence of the Engineering and Mining Journal.

THE PHIL. NEUKUMET EXHIBIT.

Besides a variety of different shapes of fire brick which they displayed, they showed two sets of gas retorts put up in working condition. One was a battery of three retorts, and the other of five. An unset retort was of the usual D form, two feet wide, 13 inches high inside, and 9 feet long.

AMERICAN KAOLIN CO.

The works of this company are located at New Garden, Chester Co., Pa. The kaolin which they use in the manufacture of the brick is found in the gneissoid formations, and probably contains too high a percentage of alkalies to give the bricks very high fire resisting qualities. The burned brick are almost white. Specimens of the raw and washed kaolin were also shown.

THE BAKER TUYERE.

Chas. H. Baker of Philadelphia made a display of Bessemer tuyeres which are designed to be self-gauging, as they wear away in the converter. One form of these tuyeres has fine blind holes made partially through them, the longest of the holes extending from the back end of the tuyere to within three inches of the nose. The other holes are made in regularly decreasing lengths so that when the converter is turned up, by looking through a tuyere from the bottom sides, the number of the blank holes which have been opened is at once seen, and consequently the wear of the tuyere to within three inches is at once known.

To avoid an objection which has been raised, that these extra holes admit nearly 50 per cent. more air when the bottom has nearly burned through than when the bottom is new, a tuyere with external grooves has been made which are successively exposed at the top of the tuyere as the bottom burns away. The wear has, in this case, to be noted from the vessel's nose. This system will permit a quicker inspection of the condition of the tuyeres than the old one, by which a wire with bent end is introduced through one of the tuyere holes to determine its length.

The fire-clays of Central Pennsylvania furnish a large supply of material for the manufacture of fire-brick in the State. Nearly all the principal beds worked are those which are found in Cambria, Clearfield, and the southern portion of Elk Counties. The beds of clay belong to the coal measure series, and are found at a short distance above the seral conglomerate or millstone grit, and sometimes directly upon it. The Sandy Ridge, the Blue Ball and the Woodland clays are all mined on the Tyrone and Clearfield Railroad. At the Sandy Ridge mines the fire-clay which is worked is usually from four to six feet thick, and it is separable into three layers which differ from each other both chemically and physically. Analyses I, II and III (given below) show the different qualities of the layers, commencing with the upper one. The upper layer is used for making furnace bottom brick, the middle layer for ordinary fire-brick, and the lower for the in-walls of blast furnaces. In appearance they all have a dark gray color, sometimes approaching to black. The Blue Ball mines are in the same bed of clay, an average analysis of the three beds being shown in Analysis IV. It will be noticed that there is a considerable percentage of titanic acid in this clay, a substance quite frequently found in fire-clays. Probably it does not impair the fire-resisting qualities of the bricks. The clay from these mines is shipped to the Harrisburg Fire-brick Company's works, where it is found to make a very fine quality of brick.

KREISCHER & BRO.

The display of this firm include various kinds of shape brick, muffle furnaces and gas retorts.

The Clearfield fire-clays, which are probably a continuation of the same beds as those just described, are worked to a considerable extent. Analysis No. V. shows the chemical character of the clay.

A. J. HAWS' WORKS.

Similar clay deposits to those of Clearfield county are found at Johnstown, in Cambria county, and it is from these that Mr. Haws supplies his works. The exhibit made from these works at the Exhibition was a very interesting one in several respects. In making it up, one thing was added which nearly all the other makers seemed to have forgotten. This omission was that of analysis to show the composition of the fire clays. Analyses Nos. VI., VII. & VIII. were given of the Johnstown. The determination of alkalies had been omitted. A comparatively novel feature in the products shown from these works was the Bessemer converter bottoms, made entirely of fire-clay lumps and tuyeres. The bottom which was shown was 46½ inches in diameter, and 16½ inches high. It contained twelve tuyeres, arranged in an outside circle of six, an inside circle of five, and a central tuyere. The internal spaces between the tuyeres were filled in with lumps of baked fire-clay having a pentagonal section, and of the same length as the tuyeres. Similar pieces, but with one side conforming to the circle of the whole bottom, were put next to the outer row of tuyeres on the outside, while semi-cylindrical pieces fitting in between these blocks completed the bottoms. The points between the different parts are very small, and are filled in with a fire-clay grouting. The tuyeres are 5½ inches in diameter at the top, and contain twelve ⅝-inch holes. The use of these bottoms, made wholly of fire-brick, has shown that they are much superior in lasting qualities to the old-fashioned ganister bottom; so much so, that although costing more for bottoms, yet their use is found to be more economical than that of the old kind. Mr. Haws has invented a machine for molding the tuyeres and other lumps used in these bottoms, and in fact for all kinds of large lumps, which works very cheaply and efficiently.

The mixed clay is forced by steam pressure into a cast-iron or wood-lined mold from a charging cylinder, the machine, in principle, working like a meat-stuffer. A man and two boys can, with this machine, turn out as much work as ten men with helpers can do by hand. An improved form of ladle-stopper is made by Mr. Haws as suggested by Mr. Holley. No key is used to hold it to the ladle-rod, but instead of it a button on the lathe is held in place by filling the conical opening made in the plug with fire-clay. Several kinds of bosh and plain brick were also shown from these works.

Among the latter is a specimen of silica brick made by cementing a fine sand together with a small amount of clay. One of these bricks, which has been exposed to the heat of an air-furnace for melting iron, has only been superficially affected.

KIN BROS.' EXHIBIT.

The works of this firm are located at Salina, Pa. The exhibit made by them contained specimens of their clays, one analysis of which is furnished (see Analysis IX). The fire-clays are quite dark and compact, and take quite a high

polish. They are found, like the others of Western Pennsylvania, above the millstone grit in Alleghany Mountain. When burned, the clays become nearly white. A few specimens of ordinary fire-brick were also shown.

UNION MINING COMPANY'S EXHIBIT.

The same coal measure which contains the fire-clay deposits of Clearfield and Cambria counties in Pennsylvania extend southward into Maryland, the eastern edge of these formations passing through Alleghany county in that State. The celebrated Mount Savage deposits are located in this county. The Union Mining Company make use of this clay, fine samples of which were shown in their display at the Exhibition. Chemically, it is similar to the deposits of Pennsylvania.

There were many bricks for special purposes shown by the company. Blast-furnace bosh and hearth-brick, some of the former two feet long, were shown. The bricks for building furnace bottoms are made on a double-wedge plan, which entirely prevents all rising of the bottom in case the molten metal should get under it. Bricks for Siemen's steel furnaces, of ten different shapes, were shown, a use for which the Mount Savage bricks at present have almost a monopoly in this country.

ENGLISH DISPLAYS.

Several of the Stourbridge makers sent specimens of their clays and finished products to the Exhibition. G. K. Harrison, Harper & Moore, and King Bros. of that place, all showed clay and bricks from their works. Some very handsome specimens, which illustrate the homogeneous and non-shrinking qualities of these clays, were made by taking a large natural lump, breaking it in two pieces, and then after burning one, replacing it on the other piece as it orginally stood. The burnt pieces showed a uniformly light color, and have not appreciably shrunk. All the makers of brick in this district form their bricks by hand, believing that unless they are carefully worked with very slight pressure, their lasting qualities will be impaired. These makers displayed some very good specimens of large bosh brick.

ANALYSES OF REFRACTORY MATERIALS.

	I.*	II.*	III.*	IV.*	V.	VI.	VII.	I .
$Si\ O_2$	46·650	44·950	45·820	43·533	46·250	64·95	45·42	68·82
$Al_2\ O_3$	34·739	37·750	35·950	38·050	37·500	21·07	36·80	30·85
Fe O	35·46	2·700	3·330	1·990	1·935	8·22	3·33	2·79
Ca O	·112	·302	·112	·075	·168	....	·87	·82
Mg O	·619	·216	·573	·192	·126	·89	·95	.23
Alkalies	5·750	·985	4·130	·498	1·115	.....	.....	.....
Water	9·650	13·050	10·130	13·890	13·540	8·81	12·65	5·83
$Ti\ O_2$	.....	.....	.....	2·342	.....	.....	.....	.....
Mn O	.....	.....	.....	.....	....	1·06	·48	·66

THE ANTHRACITE FURNACES OF THE LEHIGH AND SCHUYLKILL VALLEYS.—A correspondent of the New York *Times*, under date Catasaqua, March 14, gives the following statement of the furnaces located in the Lehigh Valley, which are in and out of blast, and the annual capacity of each:

Owners.	No. of Stacks.	Annual Capacity, Tons.	Stacks in Blast.
Allentown Iron Co.	5	54,t00	0
Allent'n Roll'g Mill Co.	2	2c,oco	1
Bethlehem Iron Co*	6	55,000	3
Carbon Iron Co.	3	34,000	0
Coleraine Iron Works.	2	26,000	1
Crane Iron Co.	6	60,000	2
Durham Iron Works	1	7,000	1
Emaus Furnace	1	7,000	1
Glendon Iron Co.	5	53.000	1
Keystone Furnace	1	10,000	0
Lehigh Iron Co.	2	21,000	1
Lehigh Valley Iron Co.	3	30,003	2
Lock Ridge Furnaces.	2	20,000	2
Millerstown Iron Co.	1	10,500	0
Northampton Iron Co.	1	10,030	1
North Penn Iron Co.	1	7,000	0
Saucon Iron Co.	2	20,000	0
Thomas Iron Co.	6	60,000	4
Uhler Furnace	1	7,500	0
Total	51	511,600	20

* One of the six Bethlehem Iron Company's furnaces is a Spiegel-eisen furnace for Bessemer steel work.

The above statement shows that about two-fifths of the furnaces of this region are in blast, and assuming 10,000 tons as the average product of each stack, the present production from the above is at the rate of 200 000 tons per annum.

The same correspondent, in a subsequent letter, gives the furnaces of the Schuylkill Valley in the following table:

Furnaces.	No. of Stacks.	Annual Capacity, Tons.	In Blast.
Aurora	1	5,'00	0
Baldwin	2	10,000	2
Cameron	1	6,000	0
Chestnut Hill	3	20,000	0
Chickies	2	10,000	2
Bird Coleman	1	8,000	1
Cornwall	2	10,000	2
Donaghmore	1	6,0c0	1
North Cornwall	1	8,000	0
Conestoga	1	6,000	0
Dauphin	1	6,0 0	0
Dock Iron Works	1	5,000	0
Donegal	1	6,500	0
Harrisburg	1	6,000	0
Kauffman	1	6,500	0
Lebanon	2	15,000	2
Lebanon Valley	1	5,000	0
Lochiel	1	7,500	1
Marietta, No. 1	1	5,000	0
Marietta, No. 2	1	5,000	0
Middletown	1	5,000	0
Musselman	1	6,000	0
Paxton	2	15,000	1
Richmond	1	3,t00	0
Safe Harbor	1	8,000	0
Stanhope	1	5,000	0
St. Charles	2	17,000	2
Union Deposit	1	5,000	0
Wistar	1	8,000	1
Total	37	223,000	16

A STEEL RING IN AUSTRIA—THE OLD STORY.—The establishment of rings for the purpose of dictating prices in the markets, which commenced in the United States, is now becoming universal, and a remarkable attempt in this direction has, according to the *Neue Freie Presse*, been lately made in Austria by a select circle of Bessemer steel manufacturers. Nine of the most important producers of railway metals have entered into a compact to distribute among each other a given percentage of all contracts for railway metals which may be given out in Austria between the present time and the year 1878. The plan of operation is to be as follows: The subscribing firms are to arrange among themselves which of them are to tender for contracts offered either by the Austrian railroad companies or by the Government. The price is to be fixed according to close calculation of the cost of production and of transportation from the works to the destination of the metals. Spurious tenders at higher prices are then to be sent by the remaining firms, thus insuring the acceptance of the tenders sent in by the selected firm or firms, 7,000 tons being the limit assigned by the agreement of the contracts to be received by the associate firms. This snug little arrangement is not likely to be interfered with by foreign competition, inasmuch as no orders for railroad metals has since the crisis been placed out of Austria by either the Government or railroad companies, the object of this restriction being the employment of Austrian working classes and the support of the existing establishments. Unfortunately, one of the smaller Bohemian firms has, in the most unprincipled manner, lately tendered at lower prices than those fixed by the "ring," and this thwarted their scheme for the present.

* Analysis made by A. S. McCreath.

THE GODERICH SALT REGION.*

By T. Sterry Hunt, LL.D., F.R.S.

(*Continued from page* 168.)

DIVISION III; from 357 to 633 feet. The separation of this from the divisions above and below was determined by the following reasons: The record of the boring gives between 351 and 357 feet "fossiliferous limestone," and two specimens of cores sent me from 357 and 360 feet, hold imbedded in a gray dolomitic paste, small white calcareous masses, which are very probably organic, inasmuch as organic remains of recognizable forms are found abundantly in the next 170 feet. Again, flint or chert was noticed, in the boring, at 379 feet, and abounded not only throughout the fossiliferous portions, but as far as 633 feet; from which lower limit up to 428 feet it was described by the foreman as a hard white and opaque rock. Below the partially calcareous stratum noticed at 360 feet, varieties of dolomite, compact, laminated, granular and bituminous, resembling those found in Division II, were seen in six specimens, to 374 feet, from between which point and 383 feet came two specimens of gray mottled cavernous limestone. Following these were dolomites, sometimes with more or less calcareous admixtures, in six specimens to 417 feet. In a specimen of gray crystalline dolomite from 402 feet were numerous cavities from two to five millimetres in diameter, left by the removal of stellate groups of bladed crystals. From between 417 and 428 feet were sent me two specimens of gray limestone, one holding a calcareous coral (*Favosites*), and another a similar coral silicified, together with a portion of chert. Below this, at 438 feet, was a layer of cellular dolomite, with crystals of carbonate of lime, after which, from 444 to 500 feet, were six specimens of gray fine-grained limestone, in three of which were corals, as before, in one case silicified. Between 500 and 509 feet was a layer of fine-grained dolomite, and between the latter and 528 feet gray limestone with corals. From between this point and 535 feet came a finely granular laminated dolomite, having white chert above and below, in immediate contact; while from 547 to 594 feet were two specimens of gray limestone, with patches and layers of white chert.

In this last interval the rock just above 535 feet 2 inches is described as rather hard, and from thence to 547 feet 7 inches, probably on account of the hardness of the rock, the drilling was effected by a solid bit. From this point to 557 feet 10 inches the annular drill was used, beyond which to 573 feet 10 inches the solid bit was again had recourse to. There is thus, in this part of the boring, a little over 28 feet from which no core was obtained. Between 594 and 633 feet were two specimens of dolomite, finely laminated and including chert, while the last portion, from 633 feet, was from a bed of white opaque chert or flint, said by the foreman to be the lower limit of this rock.

DIVISION IV; from 633 to 876 feet. Of this division, the lower limit of which was marked by the marls of V, I had twenty-six specimens, all of which were dolomites, varying in color from buff to light and dark gray. In texture they were finely or coarsely granular or compact, and often thinly laminated. Near 726 and 745 feet, and again near 840 feet, were seen casts of thin-bladed crystals, like those noticed in Division II, and were either vertical or oblique to the stratification. In four specimens, from 726 to 803 ft., thin layers of gypsum, never more than half an inch in thickness, were interstratified in the dolomites. No mention is made of gypsum in the record of the boring, but it is probable that an inspection of the whole of the cores from this division might show more of this substance. From 780 to 834 feet the record describes the rock as intermixed with slate, none of which appear in the specimens sent me.

DIVISION V; from 876 to 997 feet. Of this division, the lower limit of which is the top of the first bed of rock-salt, the first 66 feet, or to 940 feet, are described in the record as "fire-clay slate," from their resemblance in texture to strata with which the borer had been familiar in the coal-regions of Pennsylvania. From 894 feet the rock is said to have been salt to the taste, and below 940 feet crusts of salt formed on the cores in drying; so that this lower portion of the division is described in the record as "salt rock," with the exception of some harder layers, designated as "limestone." Of the first 34 feet I received four specimens, which are clayey rocks, best described as variegated marls. They are bluish-gray, dark red, greenish, and nearly white, the colors being banded and mottled in their arrangement. Below 910 feet the whole of the cores were sent to me; they consist of marls, as before, including, at 922 feet, a layer of 1½ feet of granular dolomite. Below this, much of the marl was of a dark reddish-brown, and enclosed, to the base of the division, numerous beds of dolomite, which were porous or compact and often banded.

These marls are apparently intimate mixtures of clay with dolomite, and when tried, in a great many cases, with warm chlorhydric acid, never failed to effervesce freely. Similar rocks from the same geological horizon near Brantford in Ontario were examined by me many years since. One of these, a green crumbling marl, contained 45 per cent., and another, darker and more compact, 75 per cent. of dolomite; the residue in both cases being a clay. Some of these dolomitic marls are well adapted to the manufacture of hydraulic cements. (See "Geology of Canada," 1863, pages 625 and 807.)

DIVISION VI, from 897 to 1,027 feet 11 inches; being the first bed of rock-salt. Until reaching this the drill had been supplied with water, which was now replaced by a brine, made fully saturated for the purpose, by the use of which the solution of the salt in the boring was prevented and cores of it were obtained. The first 2½ feet of this division were, however, extracted while fresh water was still employed, and showed a solid gray finely granular dolomite, from which masses of rock-salt, presenting no regular forms, and amounting perhaps to one-third of the bulk, had been dissolved. To this succeeded 7 feet 11 inches of salt, holding a small proportion of earthy matter, and including layers of dolomite; then 3 feet 9 inches of porous dolomite, with some marl, holding irregular masses of salt as before, and finally 16 feet 9 inches of salt, in parts colorless and transparent, and in part soiled by earthy impurities, and including layers of fine-grained dolomite; the whole making for this division, composed chiefly of rock salt, a thickness of 30 feet 11 inches. This stratum, as displayed in the boring, is not pure enough for mining.

DIVISION VII; from 1,027 feet 11 inches to 1,060 feet. The upper four feet of this division consists of a gray dolomite often finely laminated, with disseminated masses of salt, followed by a gray porous dolomite holding salt in frequent veins or transverse seams to 1,052 feet. The remaining eight feet of the division is marl, resembling those described above.

DIVISION VIII; from 1,060 to 1,085½ feet. This, the second bed of rock salt, has at the top 9 inches of perfectly colorless and transparent salt, to which succeed 6 ft. 9 in. of salt mixed with some rocky matter; then 7 ft. 1 in. of salt, with very little stain or discoloration, followed by 10 ft. 9 in. of pure white crystalline salt, enclosing a layer of dolomite 1 inch in thickness near the base.

* A paper read before the American Institute of Mining Engineers, at the New York meeting, February, 1877.

that depth, within an area of 338x500 feet, an ore value of $1,216,800, or 12,168 tons of ore at $100 per ton.

"The cost of mining, dressing, hauling and smelting the ore has not exceeded 40 per cent. of the ore value, and upon the completion of the deep tunnel a much smaller ratio of expense will be incurred."

These statements are confirmed by a number of mining experts, extracts from whose reports are contained in the prospectus. We have also had favorable reports of this property from our own correspondents, and there seems every prospect of the company being able to earn regular and large dividends.

During the first eighteen days of this month, eighty tons of ore was produced by a force of thirty men, and sold, we are informed by the officers of the company, for $8,000. The expenses are estimated at 40 per cent., so that the mine has produced already this month (March) the amount necessary for a dividend of one per cent., which, it is stated, will be declared on the 31st inst. A regular monthly dividend of from one to two per cent. is promised, and, with energetic management, should be obtained. It is to be hoped, however, that the company will not sacrifice the permanent prosperity of the mine to the desire to declare large monthly dividends, but push the exploration works and increase rather than diminish the amount of reserves in the mine and in the bank; in this manner we may hope to have the pleasure of recording on many future occasions our satisfaction that so valuable a property has been placed upon our new Board. With a regular dividend of 12 per cent. a year the stock would probably command par in the market, while at present it is quoted at about 50 cents on the dollar, or, in other words, the present market value of the stock is about equal to the estimated value of the ore in sight.

Seaton was one of the first valuable mines quoted on the Mining Board, and it promises to become one of the most popular. At present the transactions in the stock are large, and are participated in by capitalists who seek a remunerative and safe investment.

MR. WEEKS JUSTIFIES HIMSELF.

We have received the following letter from Mr. Weeks, of the *Iron Age*:

TO THE EDITOR—SIR: I was somewhat surprised, upon having my attention called to your article in the last issue of the ENGINEERING AND MINING JOURNAL, to find that, in replying to an editorial in the *Iron Age* of the 8th inst., you had made me the object of a personal attack. The basis of this attack is the publication in the *Iron Age* of Mr. Bell's paper read at the June meeting of the Institute, and the circumstances connected therewith. As these circumstances have been in a number of instances grossly, though I do not charge wilfully, misrepresented, I wish to say that for the opportunity of publishing that paper or any part of it, or for the possession of the manuscript, or for the privilege of copying it, I am under no obligation to any officer of the Institute, nor was I, as representative of the *Iron Age*, responsible to them or any officer for the use I made of the manuscript or the copy made from it. The manuscript did not come into my possession from or through any officer, or by their courtesy or permission, but from Mr. Bell, who gave me his consent to copy, to whom I returned it, and to whom alone I am responsible. The Secretary, after consultation with yourself, refused me permission to use it as I had previous papers, and before it had come into his possession I used it and returned it to Mr. Bell, not to the Secretary. Had I obtained the paper from the Secretary, or through him or by his consent, I would have been under some responsibility to him; but as I did not, there could have been no "clear understanding" violated, in fact I could have had no understanding as to what use I should make of this particular paper.

Regarding your intimation that my action in the matter of the Bell paper was the result of the decision of the Council refusing the offer of the *Iron Age* to print the proceedings of the Institute, I have only to say that this decision was not known to me until long after the Bell paper was published, and my recollection is that it was after such publication that the Council took this action.

A large part of the report of the Washington and Philadelphia meetings was made from manuscript notes, the report of nearly all the discussions having been made in this way, and a large part of the papers read, and not from the papers furnished me by the Secretary, though in making this statement I have no wish to deny the many obligations I am under to Prof. Drown.

Regarding your charge of obtaining copies of papers "surreptitiously," I have only to say this is not so. Every paper we have published in full we have received directly from the author, with the full knowledge that it was to be published by us, at our convenience. As the parties furnishing us with these papers were members of the Institute, if there was anything "surreptitious," they were each "*particeps criminis*." How they relish such a charge is for them to determine.

Trusting to your courtesy to give this a place in your columns,

I am, respectfully,

PITTSBURG, March 21. JOSEPH D. WEEKS, Associate Editor.

We give Mr. WEEKS the full benefit of his statement of the case, and decline to discuss with him what constitutes an "understanding," or a "surreptitious" evasion of it. Our ideas on these points are irreconcilably opposed to his.

The *Iron Age* of this week very handsomely retracts a portion of its erroneous statements concerning the management of the Institute. We have no doubt it will be convinced, in time, of the courtesy and fair-play which not only the Institute but the ENGINEERING AND MINING JOURNAL is ready to extend to it. Meanwhile, it is due to all parties to point out that with the charges which the *Iron Age* so promptly and fully retracts, all the inferences which it built upon them fall to the ground, and the way is clear for a fair discussion of the best way to publish the proceedings of such a society as the Institute. We beg the *Iron Age*, if it is still dissatisfied with the present system, to suggest a complete one which it deems better.

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REFRACTORY PRODUCTS AT THE PHILADELPHIA EXHIBITION.

(Concluded from Page 136.)

Special Correspondence of the Engineering and Mining Journal.

THE PHIL. NEUKUMET EXHIBIT.

Besides a variety of different shapes of fire brick which they displayed, they showed two sets of gas retorts put up in working condition. One was a battery of three retorts, and the other of five. An unset retort was of the usual D form, two feet wide, 13 inches high inside, and 9 feet long.

AMERICAN KAOLIN CO.

The works of this company are located at New Garden, Chester Co., Pa. The kaolin which they use in the manufacture of the brick is found in the gneissoid formations, and probably contains too high a percentage of alkalies to give the bricks very high fire resisting qualities. The burned brick are almost white. Specimens of the raw and washed kaolin were also shown.

THE BAKER TUYERE.

Chas. H. Baker of Philadelphia made a display of Bessemer tuyeres which are designed to be self-gauging, as they wear away in the converter. One form of these tuyeres has fine blind holes made partially through them, the longest of the holes extending from the back end of the tuyere to within three inches of the nose. The other holes are made in regularly decreasing lengths so that when the converter is turned up, by looking through a tuyere from the bottom sides, the number of the blank holes which have been opened is at once seen, and consequently the wear of the tuyere to within three inches is at once known.

To avoid an objection which has been raised, that these extra holes admit nearly 50 per cent. more air when the bottom has nearly burned through than when the bottom is new, a tuyere with external grooves has been made which are successively exposed at the top of the tuyere as the bottom burns away. The wear has, in this case, to be noted from the vessel's nose. This system will permit a quicker inspection of the condition of the tuyeres than the old one, by which a wire with bent end is introduced through one of the tuyere holes to determine its length.

The fire-clays of Central Pennsylvania furnish a large supply of material for the manufacture of fire-brick in the State. Nearly all the principal beds worked are those which are found in Cambria, Clearfield, and the southern portion of Elk Counties. The beds of clay belong to the coal measure series, and are found at a short distance above the seral conglomerate or millstone grit, and sometimes directly upon it. The Sandy Ridge, the Blue Ball and the Woodland clays are all mined on the Tyrone and Clearfield Railroad. At the Sandy Ridge mines the fire-clay which is worked is usually from four to six feet thick, and it is separable into three layers which differ from each other both chemically and physically. Analyses I, II and III (given below) show the different qualities of the layers, commencing with the upper one. The upper layer is used for making furnace bottom brick, the middle layer for ordinary fire-brick, and the lower for the in-walls of blast furnaces. In appearance they all have a dark gray color, sometimes approaching to black. The Blue Ball mines are in the same bed of clay, an average analysis of the three beds being shown in Analysis IV. It will be noticed that there is a considerable percentage of titanic acid in this clay, a substance quite frequently found in fire-clays. Probably it does not impair the fire-resisting qualities of the bricks. The clay from these mines is shipped to the Harrisburg Fire-brick Company's works, where it is found to make a very fine quality of brick.

KREISCHER & BRO.

The display of this firm include various kinds of shape brick, muffle furnaces and gas retorts.

The Clearfield fire-clays, which are probably a continuation of the same beds as those just described, are worked to a considerable extent. Analysis No. V. shows the chemical character of the clay.

A. J. HAWS' WORKS.

Similar clay deposits to those of Clearfield county are found at Johnstown, in Cambria county, and it is from these that Mr. Haws supplies his works. The exhibit made from these works at the Exhibition was a very interesting one in several respects. In making it up, one thing was added which nearly all the other makers seemed to have forgotten. This omission was that of analysis to show the composition of the fire clays. Analyses Nos. VI., VII. & VIII. were given of the Johnstown. The determination of alkalies had been omitted. A comparatively novel feature in the products shown from these works was the Bessemer converter bottoms, made entirely of fire-clay lumps and tuyeres. The bottom which was shown was 46½ inches in diameter, and 16½ inches high. It contained twelve tuyeres, arranged in an outside circle of six, an inside circle of five, and a central tuyere. The internal spaces between the tuyeres were filled in with lumps of baked fire-clay having a pentagonal section, and of the same length as the tuyeres. Similar pieces, but with one side conforming to the circle of the whole bottom, were put next to the outer row of tuyeres on the outside, while semi-cylindrical pieces fitting in between these blocks completed the bottoms. The points between the different parts are very small, and are filled in with a fire-clay grouting. The tuyeres are 5½ inches in diameter at the top, and contain twelve ⅝-inch holes. The use of these bottoms, made wholly of fire-brick, has shown that they are much superior in lasting qualities to the old-fashioned ganister bottom; so much so, that although costing more for bottoms, yet their use is found to be more economical than that of the old kind. Mr. Haws has invented a machine for molding the tuyeres and other lumps used in these bottoms, and in fact for all kinds of large lumps, which works very cheaply and efficiently.

The mixed clay is forced by steam pressure into a cast-iron or wood-lined mold from a charging cylinder, the machine, in principle, working like a meat-stuffer. A man and two boys can, with this machine, turn out as much work as ten men with helpers can do by hand. An improved form of ladle-stopper is made by Mr. Haws as suggested by Mr. Holley. No key is used to hold it to the ladle-rod, but instead of it a button on the lathe is held in place by filling the conical opening made in the plug with fire-clay. Several kinds of bosh and plain brick were also shown from these works.

Among the latter is a specimen of silica brick made by cementing a fine sand together with a small amount of clay. One of these bricks, which has been exposed to the heat of an air-furnace for melting iron, has only been superficially affected.

KIN BROS.' EXHIBIT.

The works of this firm are located at Salina, Pa. The exhibit made by them contained specimens of their clays, one analysis of which is furnished (see Analysis IX). The fire-clays are quite dark and compact, and take quite a high

polish. They are found, like the others of Western Pennsylvania, above the millstone grit in Alleghany Mountain. When burned, the clays become nearly white. A few specimens of ordinary fire-brick were also shown.

UNION MINING COMPANY'S EXHIBIT.

The same coal measure which contains the fire-clay deposits of Clearfield and Cambria counties in Pennsylvania extend southward into Maryland, the eastern edge of these formations passing through Alleghany county in that State. The celebrated Mount Savage deposits are located in this county. The Union Mining Company make use of this clay, fine samples of which were shown in their display at the Exhibition. Chemically, it is similar to the deposits of Pennsylvania.

There were many bricks for special purposes shown by the company. Blast-furnace bosh and hearth-brick, some of the former two feet long, were shown. The bricks for building furnace bottoms are made on a double-wedge plan, which entirely prevents all rising of the bottom in case the molten metal should get under it. Bricks for Siemen's steel furnaces, of ten different shapes, were shown, a use for which the Mount Savage bricks at present have almost a monopoly in this country.

ENGLISH DISPLAYS.

Several of the Stourbridge makers sent specimens of their clays and finished products to the Exhibition. G. K. Harrison, Harper & Moore, and King Bros. of that place, all showed clay and bricks from their works. Some very handsome specimens, which illustrate the homogeneous and non-shrinking qualities of these clays, were made by taking a large natural lump, breaking it in two pieces, and then after burning one, replacing it on the other piece as it orginally stood. The burnt pieces showed a uniformly light color, and have not appreciably shrunk. All the makers of brick in this district form their bricks by hand, believing that unless they are carefully worked with very slight pressure, their lasting qualities will be impaired. These makers displayed some very good specimens of large bosh brick.

ANALYSES OF REFRACTORY MATERIALS.

	I.*	II.*	III.*	IV.*	V.	VI.	VII.	I .	.
$Si\ O_2$	46·650	44·950	45·820	43·533	46·250	64·95	45·42	68·82	
$Al_2\ O_3$	34·739	37·750	35·950	38·050	37·500	21·07	36·80	30·85	
Fe O	35·46	2·700	3·330	1·990	1·935	8·22	3·33	2·79	
Ca O	·112	·302	·112	·075	·168	....	·87	·82	
Mg O	·619	·216	·573	·192	·126	·89	·95	.23	
Alkalies	5·750	·985	4·130	·498	1·115	.....	.....	.....	
Water	9·650	13·050	10·130	13·890	13·540	8·81	12·65	5·83	
$Ti\ O_2$	.....	.....	.....	2·342	.....	.....	.....	.....	
Mn O	.....	.....	.....	.....	....	1·06	·48	·66	

THE ANTHRACITE FURNACES OF THE LEHIGH AND SCHUYLKILL VALLEYS.—A correspondent of the New York *Times*, under date Catasaqua, March 14, gives the following statement of the furnaces located in the Lehigh Valley, which are in and out of blast, and the annual capacity of each:

Owners.	No. of Stacks.	Annual Capacity, Tons.	Stacks in Blast.
Allentown Iron Co.	5	54,t00	0
Allent'n Roll'g Mill Co.	2	2c.oco	1
Bethlehem Iron Co*.	6	55,000	3
Carbon Iron Co.	3	34,000	0
Coleraine Iron Works.	2	26,000	1
Crane Iron Co.	6	60,000	2
Durham Iron Works.	1	7,000	1
Emaus Furnace.	1	7,000	1
Glendon Iron Co.	5	53.000	1
Keystone Furnace.	1	10,000	0
Lehigh Iron Co.	2	21,000	1
Lehigh Valley Iron Co.	3	30,000	2
Lock Ridge Furnaces.	2	20,000	2
Millerstown Iron Co.	1	10,500	0
Northampton Iron Co.	1	10,000	1
North Penn Iron Co.	1	7,000	0
Saucon Iron Co.	2	20,000	0
Thomas Iron Co.	6	60,000	4
Unler Furnace.	1	7,500	0
Total	51	511,600	23

*One of the six Bethlehem Iron Company's furnaces is a Spiegel-eisen furnace for Bessemer steel work.

The above statement shows that about two-fifths of the furnaces of this region are in blast, and assuming 10,000 tons as the average product of each stack, the present production from the above is at the rate of 200 000 tons per annum.

The same correspondent, in a subsequent letter, gives the furnaces of the Schuylkill Valley in the following table:

Furnaces.	No. of Stacks.	Annual Capacity, Tons.	In Blast.
Aurora	1	5,'00	0
Baldwin	2	10,000	2
Cameron	1	6,000	0
Chestnut Hill	3	20,000	0
Chickies	2	10,000	2
Bird Coleman	1	8,000	1
Cornwall	2	10,000	2
Donaghmore	1	6,0c0	1
North Cornwall	1	8,000	0
Conestoga	1	6,000	0
Dauphin	1	6,0 0	0
Dock Iron Works	1	5,000	0
Donegal	1	6,500	0
Harrisburg	1	6,000	0
Kauffman	1	6,500	0
Lebanon	2	15,000	2
Lebanon Valley	1	5,000	0
Lochiel	1	7,500	1
Marietta, No. 1	1	5,000	0
Marietta, No. 2	1	5,000	0
Middletown	1	5,000	0
Musselman	1	6,000	0
Paxton	2	15,000	1
Richmond	1	3,t00	0
Safe Harbor	1	8,000	0
Stanhope	1	5,000	0
St. Charles	2	12,000	2
Union Deposit	1	5,000	0
Wistar	1	8,000	1
Total	37	223,000	16

A STEEL RING IN AUSTRIA—THE OLD STORY.—The establishment of rings for the purpose of dictating prices in the markets, which commenced in the United States, is now becoming universal, and a remarkable attempt in this direction has, according to the *Neue Freie Presse*, been lately made in Austria by a select circle of Bessemer steel manufacturers. Nine of the most important producers of railway metals have entered into a compact to distribute among each other a given percentage of all contracts for railway metals which may be given out in Austria between the present time and the year 1878. The plan of operation is to be as follows: The subscribing firms are to arrange among themselves which of them are to tender for contracts offered either by the Austrian railroad companies or by the Government. The price is to be fixed according to close calculation of the cost of production and of transportation from the works to the destination of the metals. Spurious tenders at higher prices are then to be sent by the remaining firms, thus insuring the acceptance of the tenders sent in by the selected firm or firms, 7,000 tons being the limit assigned by the agreement of the contracts to be received by the associate firms. This snug little arrangement is not likely to be interfered with by foreign competition, inasmuch as no orders for railroad metals has since the crisis been placed out of Austria by either the Government or railroad companies, the object of this restriction being the employment of Austrian working classes and the support of the existing establishments. Unfortunately, one of the smaller Bohemian firms has, in the most unprincipled manner, lately tendered at lower prices than those fixed by the "ring," and this thwarted their scheme for the present.

* Analysis made by A. S. McCreath.

THE GODERICH SALT REGION.*

By T. Sterry Hunt, LL.D., F.R.S.

(*Continued from page* 168.)

DIVISION III; from 357 to 633 feet. The separation of this from the divisions above and below was determined by the following reasons: The record of the boring gives between 351 and 357 feet "fossiliferous limestone," and two specimens of cores sent me from 357 and 360 feet, hold imbedded in a gray dolomitic paste, small white calcareous masses, which are very probably organic, inasmuch as organic remains of recognizable forms are found abundantly in the next 170 feet. Again, flint or chert was noticed, in the boring, at 379 feet, and abounded not only throughout the fossiliferous portions, but as far as 633 feet; from which lower limit up to 428 feet it was described by the foreman as a hard white and opaque rock. Below the partially calcareous stratum noticed at 360 feet, varieties of dolomite, compact, laminated, granular and bituminous, resembling those found in Division II, were seen in six specimens, to 374 feet, from between which point and 383 feet came two specimens of gray mottled cavernous limestone. Following these were dolomites, sometimes with more or less calcareous admixtures, in six specimens to 417 feet. In a specimen of gray crystalline dolomite from 402 feet were numerous cavities from two to five millimetres in diameter, left by the removal of stellate groups of bladed crystals. From between 417 and 428 feet were sent me two specimens of gray limestone, one holding a calcareous coral (*Favosites*), and another a similar coral silicified, together with a portion of chert. Below this, at 438 feet, was a layer of cellular dolomite, with crystals of carbonate of lime, after which, from 444 to 500 feet, were six specimens of gray fine-grained limestone, in three of which were corals, as before, in one case silicified. Between 500 and 509 feet was a layer of fine-grained dolomite, and between the latter and 528 feet gray limestone with corals. From between this point and 535 feet came a finely granular laminated dolomite, having white chert above and below, in immediate contact; while from 547 to 594 feet were two specimens of gray limestone, with patches and layers of white chert.

In this last interval the rock just above 535 feet 2 inches is described as rather hard, and from thence to 547 feet 7 inches, probably on account of the hardness of the rock, the drilling was effected by a solid bit. From this point to 557 feet 10 inches the annular drill was used, beyond which to 573 feet 10 inches the solid bit was again had recourse to. There is thus, in this part of the boring, a little over 28 feet from which no core was obtained. Between 594 and 633 feet were two specimens of dolomite, finely laminated and including chert, while the last portion, from 633 feet, was from a bed of white opaque chert or flint, said by the foreman to be the lower limit of this rock.

DIVISION IV; from 633 to 876 feet. Of this division, the lower limit of which was marked by the marls of V, I had twenty-six specimens, all of which were dolomites, varying in color from buff to light and dark gray. In texture they were finely or coarsely granular or compact, and often thinly laminated. Near 726 and 745 feet, and again near 840 feet, were seen casts of thin-bladed crystals, like those noticed in Division II, and were either vertical or oblique to the stratification. In four specimens, from 726 to 803 ft., thin layers of gypsum, never more than half an inch in thickness, were interstratified in the dolomites. No mention is made of gypsum in the record of the boring, but it is probable that an inspection of the whole of the cores from this division might show more of this substance. From 780 to 834 feet the record describes the rock as intermixed with slate, none of which appear in the specimens sent me.

DIVISION V; from 876 to 997 feet. Of this division, the lower limit of which is the top of the first bed of rock-salt, the first 66 feet, or to 940 feet, are described in the record as "fire-clay slate," from their resemblance in texture to strata with which the borer had been familiar in the coal-regions of Pennsylvania. From 894 feet the rock is said to have been salt to the taste, and below 940 feet crusts of salt formed on the cores in drying; so that this lower portion of the division is described in the record as "salt rock," with the exception of some harder layers, designated as "limestone." Of the first 34 feet I received four specimens, which are clayey rocks, best described as variegated marls. They are bluish-gray, dark red, greenish, and nearly white, the colors being banded and mottled in their arrangement. Below 910 feet the whole of the cores were sent to me; they consist of marls, as before, including, at 922 feet, a layer of 1½ feet of granular dolomite. Below this, much of the marl was of a dark reddish-brown, and enclosed, to the base of the division, numerous beds of dolomite, which were porous or compact and often banded.

These marls are apparently intimate mixtures of clay with dolomite, and when tried, in a great many cases, with warm chlorhydric acid, never failed to effervesce freely. Similar rocks from the same geological horizon near Brantford in Ontario were examined by me many years since. One of these, a green crumbling marl, contained 45 per cent., and another, darker and more compact, 75 per cent. of dolomite; the residue in both cases being a clay. Some of these dolomitic marls are well adapted to the manufacture of hydraulic cements. (See "Geology of Canada," 1863, pages 625 and 807.)

DIVISION VI, from 897 to 1,027 feet 11 inches; being the first bed of rock-salt. Until reaching this the drill had been supplied with water, which was now replaced by a brine, made fully saturated for the purpose, by the use of which the solution of the salt in the boring was prevented and cores of it were obtained. The first 2½ feet of this division were, however, extracted while fresh water was still employed, and showed a solid gray finely granular dolomite, from which masses of rock-salt, presenting no regular forms, and amounting perhaps to one-third of the bulk, had been dissolved. To this succeeded 7 feet 11 inches of salt, holding a small proportion of earthy matter, and including layers of dolomite; then 3 feet 9 inches of porous dolomite, with some marl, holding irregular masses of salt as before, and finally 16 feet 9 inches of salt, in parts colorless and transparent, and in part soiled by earthy impurities, and including layers of fine-grained dolomite; the whole making for this division, composed chiefly of rock salt, a thickness of 30 feet 11 inches. This stratum, as displayed in the boring, is not pure enough for mining.

DIVISION VII; from 1,027 feet 11 inches to 1,060 feet. The upper four feet of this division consists of a gray dolomite often finely laminated, with disseminated masses of salt, followed by a gray porous dolomite holding salt in frequent veins or transverse seams to 1,052 feet. The remaining eight feet of the division is marl, resembling those described above.

DIVISION VIII; from 1,060 to 1,085½ feet. This, the second bed of rock salt, has at the top 9 inches of perfectly colorless and transparent salt, to which succeed 6 ft. 9 in. of salt mixed with some rocky matter; then 7 ft. 1 in. of salt, with very little stain or discoloration, followed by 10 ft. 9 in. of pure white crystalline salt, enclosing a layer of dolomite 1 inch in thickness near the base.

*A paper read before the American Institute of Mining Engineers, at the New York meeting, February, 1877.

The whole of this division, measuring 25 ft. 4 in., is fit for mining, and in some parts, as will be shown, is of remarkable purity.

DIVISION IX; from 1,085 ft. 4 in. to 1,092 ft. 2 in. This bed, of 6 ft. 2 in., consists of dolomite, holding salt both in interstratified layers and in thin vertical seams.

DIVISION X, from 1,092 ft. 2 in. to 1,127 ft., makes the third bed of rock salt, 34 ft. 10 in. in thickness, and consists throughout of solid salt, with a very small proportion of impurities, which give it a slight shade of color. With a little sorting it might probably be used for all ordinary purposes. It should here be remarked that of the lower 5 ft. 5 in. of core from this bed, only about one-half was received.

DIVISION XI; from 1127 ft. to 1207 ft. 7 in. This portion, of 80 ft. 7 in., consists, for the first 43 feet, of grey marls, enclosing much red salt in layers and in vertical veins, and including, moreover, numerous thin dolomitic beds. Below 1,170 feet there is found, for a distance of 4 feet, granular dolomite, with several layers of grayish-white translucent anhydrite about an inch in thickness, followed by porous dolomite beds, with some marls, the whole enclosing vertical veins of rock salt, which are reddish in color and fibrous in structure, the fibres being transverse to the sides of the veins.

DIVISION XII; from 1,207 feet 7 inches to 1,223 feet. This is the fourth bed of rock-salt, from which, as appears from the record, only the upper two feet and the lower two feet nine inches of cores were preserved. Of these the former was somewhat impure, and the latter was a white salt, including thin layers of dolomite.

DIVISION XIII; from 1,223 to 1,230 feet. This division of seven feet consists, at the top, of one foot of porous dolomite, followed by two feet of granular anhydrite, holding irregular masses and grains of salt, beneath which are four feet of dolomite and marl.

The anhydrite, or anhydrous sulphate of lime from this division resembled closely that found in Divisions XI, XV and XVII. It was finely granular crystalline, very tough, bluish-gray in color, and subtranslucent. A specimen free from included salt had a specific gravity of 2·90, and lost by ignition only ·62 per cent. of its weight.

DIVISION XIV, from 1,230 to 1,243½ feet, is the fifth bed of rock-salt, measuring 13½ feet. Of this core, by an accident, the greater part was dissolved in the bore-hole, but 5½ feet from above 1,241 feet are preserved, and are impure salt, though clear and white in portions.

DIVISION XV; from 1,243½ to 1,379 feet. From this division, of 135½ feet, only 109½ feet of core were preserved. They consisted of red, bluish and greenish marls banded and variegated, holding throughout layers of reddish salt of from a few inches to a foot, and at about 1,300 feet one or two feet, in thickness. Below this are several thin layers of bluish anhydrite, followed by soft exfoliating marls, chiefly reddish in color. No beds of hard dolomite were found in this division.

DIVISION XVI; from 1,379 to 1,385 feet. This, which is the sixth bed of rock-salt, measures six feet, and is pure white and translucent.

DIVISION XVII; from 1,385 to 1,517 feet. This division, extending to the bottom of the boring, was exceedingly soft, so that from the 132 feet only 28 ft. 3 in. cores were preserved. At the top were six feet of porous dolomite, holding layers of from two to four inches of bluish anhydrite. The portions preserved from below this consisted of soft exfoliating variegated marls, chiefly greenish and grayish in color. The ten feet at the base, however, consisted of a dark gray dolomitic rock, somewhat harder, but crumbling and sehilited cavities from the dissolving out of salt. These lower portions also included thin layers of anhydrite. The boring at this point was abandoned because it was considered that no practical good results were to be expected from its continuance.

TO BE CONTINUED.

IMPORTANT IMPROVEMENT IN LINING BESSEMER CONVERTERS.—Mr. A. S. Dunning, Assistant Superintendent of the Joliet Iron and Steel Co., describes in the *Inter Ocean*, the improvement in converter bottoms as used in their works, as follows: The improvement consists of an improved process of lining the interior fire surface of the shell and bottom of the converter, the lining being a fire-proof mixture which, when prepared with the desired materials, is of the consistency of stiff mortar. In lining the converter this mixture is made into balls by hand, which are placed around the inner fire-surface of the vessel in successive tiers, and also on the bottom around the tuyeres. While the mixture is still pliant in these balls it is compressed into a uniform surface compactly and into one homogeneous mass. After the lining is thus treated a fire is made in the vessel, when it is dried and ready for use. Under the action of heat the bottom and lining wears as smooth as glass, forming a fire-proof surface, which is incapable of blowing out in layers or pieces, and outlasting the tuyeres. But should a tuyere burn out, it leaves the hole perfect to plug or insert another tuyere as is optional. It is not necessary to explain the process by which bottoms and converters are commonly lined, which is the tamped or brick process—all steel men understand this method. Neither is it necessary to say that linings and bottoms put in by that process invariably blow out, disabling the bottom so as to make it unable to stand more than from three to seven heats. Our improved process of lining bottoms and vessels with a soft, plastic mixture alone, is the only process of this kind now in use. All others are tamped in layers or are made of brick. By this improved process one bottom has been lined by the boss bottommaker, Mr. Ed. Hillock, and one helper, in twelve and one-half minutes, being timed by Mr. John Scott, of St. Louis, ex-president of the company. This same bottom ran fourteen heats. These bottoms, instead of blowing up or scaling off as the tamped bottoms do, simply burn off on their fire-surface after running an average of fifteen heats per bottom. Having shown the nature of this improvement, I will produce a few figures showing its superior economical character and tests. In the year 1875, I used, in these works, 1,158 of the tamped bottoms commonly used now, making 45,319 tons of steel, an average of 39 157-1158 tons per bottom. For this it required 8,221 blows an average of 7 157-1158 blows per bottom. Now mark the difference. In the following year, with the improved process, I used only 628 bottoms, making 53,316 tons of steel, an average of 84 41-157 tons per bottom. For this it required 8,242 blows, an average of 13 39-314 blows per bottom. Thus, with the improved process, 530 bottoms less were used during 1876 than with the common process during the preceding year, which, at $14 per bottom, saved to the company $7,420; besides, more steel was saved and less labor required. The cost for labor of knocking out and lining up a converter is $18, and for the material $30 50, making $48.50, and not a brick used in the process. This is a saving of from $50 to $60 on lining over the common process. As to labor with the use of the improved process, I employ but *six* men, four vessel men, two on the day and two on the night turn, and but two bottom makers. With the common process I employed five men on the bottoms alone, and I need not say that it requires from six to nine men to do the same work in similar mills that I now do with two, to say nothing of the additional expense of bottoms and linings used by the common process. The difference in the cost is apparent.

In giving these figures I have adhered strictly to the operating of the works at Joliet, and those with which I have been connected as superintendent, viz.: The Bridgeport Converting Mill, of Chicago, and the Newburgh Converting Mill, of Ohio, contrasting only the economical superiority of the process used in the Joliet mills now, over the process used previously in these mills as well as those named. Were I disposed to contrast the economical features of the improvement with the process generally in use, the difference that would be presented in favor of the improved process would be much greater, as all practical steel men know.

Another important improvement in the Joliet converting mill, which saves a great amount of both steel and labor, in comparison with other works, is the improved straight nose converter; and were it not for the fact that other mills have discarded the angular nose converter and adopted in lieu thereof, either wholly or partially, our straight nose, they could not possibly compete with our converters with their improved nose, linings and bottoms, or in reference to labor, wear, capacity for work, practical utility, and general economy.

PUMPING ENGINES.*

By John Birkinbine, of Philadelphia.

In all metallurgical processes and mining operations, water is an element which receives attention from the management; and provision is required either for a means of supply, or for the disposal of accumulation. In many works the quantity of water to be furnished is sufficiently large to place the item of water supply of equal importance to the reception of material or disposition of product; and the means to be employed receive, or should receive, the most careful investigation.

There are exceptional cases where mines or quarries possess a natural drainage, but a large majority of the useful ores and the fuels delved from the earth are obtained from workings in which water accumulates and must be removed. Often the quantity to be disposed of is very great, and the distance to which it must be elevated amounts to hundreds of feet.

The magnitude of the work to be done, either in furnishing a supply for large metallurgical works or in draining extensive mines, demands the employment of powerful machinery, the economical operation of which is of great importance to the management, both as a pecuniary and practical consideration. It is therefore probable that a few notes on the general character of pumping engines may prove interesting to many of the members of the Institute. No attempt will be made in this paper to go into details of special machines, but the general features of the different classes will be briefly considered.

When a large amount of water is to be elevated to any considerable height, the prominent question to be considered is not "what will sufficiently powerful machinery cost?" but it is "what will be cost per annum, or per ton of product, to drain the mine, or supply the works?" as the case may be.

To obtain this information it is necessary to be in possession of the following facts:

1. Fuel consumed to do a given amount of work.
2. Durability, and liability to derangement, breakage or repairs.
3. Cost of attendants, lubricants, etc.
4. Interest on first cost of machinery.

The items rank in importance in the order named.

The term "duty," as applied to pumping engines, indicating how many million pounds of water can be raised one foot by the consumption of one hundred pounds of fuel, is the generally accepted standard of comparison, and it is the true index of the merits of a machine when it is the result of long continued operation, considered in connection with the other items above specified.

A saving of a small amount of fuel each day is augmented into a large sum in a year, and represents the interest on a considerable outlay in construction.

Owing to the fact that in America it is mostly coal mines which require powerful pumping machinery, the "duty" of the apparatus has not been so jealously considered; for waste or culm is principally used for fuel, and the labor troubles have encouraged operators to employ cheap engines to a considerable extent, rather than economical ones of more expensive construction. But at these mines each ton consumed cost something to remove and handle, and therefore represents value.

An engine which is required to raise three hundred thousand (300,000) cubic feet (or two and a quarter million gallons) per day to a height of two hundred feet, would perform a work each day equivalent to raising 3,750,000,000 pounds one foot high. If this engine was capable of working with sufficient economy to give an average duty of sixty million foot-pounds (a duty within safe bounds), the daily consumption of coal would be 6,250 pounds, aggregating in one year 1,018 tons; if, however, it gave no higher duty than the average of American pumping engines, say twenty-five million foot-pounds, the daily consumption of coal would reach 15,000 pounds, aggregating in a year 2,444 tons, a difference in favor of the 60,000,000 engine of 1,426 tons. If this fuel cost but one dollar per ton, the saving would pay for at least two laborers' time, or if capitalized at seven per cent. would permit of an expenditure of $20,367 more for a 60,000,000 engine than for a 25,000,000 engine.

In mines where ores of the useful metals are extracted, the saving would be much greater, and in proportion to the cost of the fuel. If coal cost $4 at such a mine, the saving above would be quadrupled, and amount each year to $5,703, representing a capital invested of nearly $81,500—a sum amply sufficient to pay for a very elaborate pumping engine of more than double the power above cited.

For many years the "duty" of pumping engines has received prominence in European mining countries, and most of the reliable data which we now possess are the results of the operations of engines at foreign mines. The English operators deemed it so important that prizes were offered to engineers doing the most work with 100 pounds of coal. While this had the effect of showing what the engines would do, and improving the average duties, it also brought into existence the various plans of "doctoring" pumping engines to secure empirical and excessive duties by the exercise of sharp practices, thereby detracting from the reliability of some of the reports.

In America the records of duties are principally from water-works engines, but, unfortunately, many of them are the results of but a few hours running, under the most favorable circumstances, and with numerous allowances for imaginary contingencies, and do not indicate the daily operation of the engines. The duty of an engine is not to be considered the result of such a test, but it should be calculated from the water raised and coal consumed in a year or a series of years.

The liability to disarrangement of parts, breakage, and consequent repairs exists, of course, in all machines to a greater or less extent; the ratio being practically in proportion to the number of moving parts, and not to the weights of the machines. Care in proportioning, and attention to details of construction, greatly reduce the possibilities of accident, but the more numerous the wearing parts, the greater are the probabilities of repairs, and, generally, the shorter the life of an engine.

A pumping engine may give a high "duty," and yet be so short-lived as not

*A paper read before the American Institute of Mining Engineers at the New York meeting, February, 1877.

to be an economical machine, for the numerous stoppages and expenditures required for repairs, or the rapid deterioration of the engine, often amounts to more than the saving in fuel.

The cost of attendance, while entering into the calculation of the economy of an engine, does not attain the importance often ascribed to it, for the maintenance of any large piece of machinery demands (and should receive) careful and constant attention from competent parties, and cheap engineers are among the most expensive features which can be introduced into any establishment. There is no just reason why a pumping engine should not receive as jealous and watchful care from skilled attendants as a blowing engine or rolling-mill engine, and yet some pumping machines are claimed as superior to others because "any boy can run them."

The amount of lubricants required for an engine are given a place in the comparison of different apparatus, not so much for the sum expended upon them (although this, in many instances, is no small outlay), as for an index of the durability of a machine, for generally the engines requiring excessive lubrication wear rapidly, and consequently are "short lived."

The interest upon the first cost of an engine, very properly, is considered in the estimate of its efficiency; but it is often accredited with more importance than is justly due it.

The consumption per day, or 100 lb. of coal, or of a quart of good lubricants, or a half-hour's work in the machine-shop for repairs, will, under ordinary circumstances, represent a greater amount per annum than the interest on a thousand dollars; therefore, where all these items are increased in any engine, its economy becomes doubtful, and any saving in its first cost is quickly absorbed by such daily expenditures.

These remarks apply to pumping engines without unnecessary ornamentation, for this should be a matter of separate consideration. Any good machine is worthy of a good workmanlike finish, and the addition of gilding, nickel-plating, fancy turning or fresco painting is not to be estimated in the record of comparative economy. There are pumping engines now in use in this country which have cost, to put in place, over $300,000, yet I greatly doubt if there is in America a pumping engine worth, intrinsically, to-day $100,000.

A pumping engine is a compound machine, made up of a steam engine (or the essential parts of one) and a pump (or pumps) combined, connected and arranged in a great variety of forms.

The proper proportion and arrangement of the parts of an ordinary steam engine are now so well understood and generally agreed upon, that, as a motor for converting the steam generated in boilers into work, there seems to be but little room for further improvement, and the direction of invention is rather towards obtaining better results from boilers.

Among the acknowledged essential elements for obtaining economic operation in a steam engine, are high piston speed and expansion; and a large majority of pump manufacturers consider slow piston speed as necessary to secure a high duty in pumping engines.

In dealing with such a ponderous and unyielding substance as water, there are many difficulties to be overcome in making a pump to work at a high piston speed, and it may be considered impossible to be able to operate a pump with the same velocity as is practicable with an engine using the lighter and more elastic form of water (steam) only.

The attainment of moderately high speed in pumping engines is, however, easily accomplished, and well-proportioned pumping engines of large capacity, which are provided with ample water-ways, and properly constructed water-cushioned valves, have been (and are now) operated successfully against heavy pressures, at a speed of 250 feet per minute, without "thug," concussion, or injury to the permanency of the apparatus, and there is no doubt but that the speed can be still further increased.

Although the pump for raising water ante-dates the steam engine by some thousands of years, and is a more simple machine, yet, in the proportioning and constructive arrangement of parts, there appears to be no acknowledged standard.

The pumps are made to force or push the water, or simply to lift the water; there are double-acting piston pumps, plunger pumps, or bucket and plunger pumps. They are worked singly, or in pairs or more, so connected as to deliver the water at different intervals.

If we add to these the rotary and centrifugal pumping machines, and the numerous arrangements introduced to lift water by the condensation and force by direct pressure of steam, we have a variety whose name is Legion.

In the details of pumps of a similar class, there are as radical differences. Valves are made hinged or "flap," "poppet," "single-beat," "double-beat," or "treble-beat" (I prefer the expressions single, double, or treble seat as more expressive). They are made of leather, rubber, wood, brass, composition, or iron. In proportions they are constructed large enough to answer for each operation of charging or emptying the pumps, or they are divided up into a number of small valves.

In fact, there is in pumps no acknowledged and accepted general arrangement in which intelligent mechanics and builders approximate an agreement.

In combining the two essential parts of a pumping engine, the steam engine and the pump, there is as much difference of opinion and controversy as to the mode of connecting and the arrangement of the parts. Some are operated direct, the piston of the steam cylinder being connected directly with that of the pump; others have intervening gearing, beams, or bell-cranks.

A visit to the pumping works supplying our large cities will demonstrate the variety of design and arrangement adopted by various engineers; nor is this variety confined to the different cities, for many of them have, as a means of supply, engines differing materially; and the city which uses engines of similar design and construction is the exception rather than the rule.

The city of Philadelphia employs sixteen pumping engines in connection with its water supply, which represent ten distinct varieties. Providence employs four pumping engines, all of radically different types. Buffalo, Cleveland, Cincinnati, and other large municipalities, are similarly provided.

To secure the advantage of a high piston speed in the steam engine, and operate the pump at a slower velocity, numerous designs have been introduced. One of the largest engines of late construction, built to secure this result, is a vertical compound steam engine, transferring its power through gearing to horizontal pumps. The great objections to such a design are the multiplicity of parts, and the difficulty of procuring gearing which will operate without back-lash or play between the cogs.

Another engine, which is also of late construction, consists of a compound engine, each cylinder operating a pump by means of a rocking or oscillating beam, the connecting rods of the steam cylinder and of the pump being so disposed that the steam piston passes through double the stroke of the pump piston, but the same number of strokes are made in a given time, and the difficulty generally experienced is in the change of direction of the water, and the opening and closing of the valves, and not in the actual speed of the piston.

In an article published in one of our engineering journals the untenable position is taken that a multitude of small valves offer less resistance to the flow of water through them than one large valve; while practice demonstrates that large valves offer less resistance proportionately than a number of small ones aggregating an equal area; and if double-beat valves are employed of appropriate construction, they will close as soon as the current of water ceases to flow through them, without the addition of weights or springs or the return current of the water.

In using a number of small valves it is found necessary to load them, or to hold them down by springs, particularly if they are of rubber, to insure their closing; and even then it is rarely found that they all close properly; an examination of a pump using such valves generally exhibits some of them chipped or held partly open, and a consequent loss resulting.

A valve should be complete in itself, and the necessity of the employment of extraneous forces to produce the proper operation of the valves is evidence of a defect of construction or a want of adaptability for the purpose for which it is employed.

In a recent test of a pumping engine an allowance is made for a pressure of six pounds per square inch for the operation of each set of valves; this seems excessive, for it reduces the suction power of the engine so that it cannot draw the water over eighteen feet.

A large valve is now in operation which offers a resistance of but 0·63 of a pound per square inch, or but one-tenth that just mentioned. This resistance is 382 per cent. of what is credited to the Lynn engine, and 85 per cent. of what, as stated, is required to lift the valves on the Lawrence engine.

The pumping engine which best meets the peculiarities of both steam and water is what is known as the Cornish engine, practically the Bolton and Watt single acting engine.

The advantages of this class of engine is that the in-door or steam stroke of the cylinder can be made quickly, and the out-door or pumping stroke is made slowly, while the water is discharged as the weighted plunger settles; the steam passing from one end of the cylinder to the other, and forming an equilibrium during the interval between the steam and pumping stroke; and the connection with the condenser being made in the interval between the pumping and the steam stroke.

This form of engine is particularly useful in mines and shafts requiring long operating rods; and for general purposes, when a considerable volume of water is to be elevated, it may be considered as the most economical and durable type of pumping engine. This may be deemed a bold assertion in the face of published reports of some late tests; but I am convinced that a Cornish pumping engine properly proportioned, constructed and managed, will give, during its continued operation, equal if not superior economic results to any other form of pumping engine.

One great advantage of this class of engine is the variety of speeds at which it can be operated. I have seen a Bull Cornish engine capable of raising 1,250,000 gallons to a height of 230 feet, operating satisfactorily at speeds varying from 20 strokes per minute to one stroke in three minutes.

That class of direct-acting pumping engines without fly-wheels, the "tappet pump," is, on account of cheapness and judicious presentation to public notice, probably more popular than any other form at present. In their construction marked ingenuity has been employed, and where the work to be done is comparatively small, or the uses for which they are employed are of a temporary or supplementary character, they answer a very good purpose; but they do not prove to be either durable or economical in their operation.

In a recent defence of this class of engine, an attempt was made to demonstrate that a crank controlled by a fly-wheel and the motion of the piston or plunger of a pump, produce a constant damaging conflict of forces, which not only absorbs a large percentage of power, but also tends to destroy the machinery.

The motion of the piston of a pump, produced by a crank with a fly-wheel of sufficient momentum to maintain a uniform velocity, is from rest at the "dead-point," by accelerated velocity, to full stroke at 90 degrees, and from that point, by constantly diminishing velocity, to the opposite dead point, where there is sufficient rest to permit of valves seating themselves, and the direction of the water changing, the return stroke being from the "dead point" by accelerated velocity to 90 degrees, and thence, by decreasing velocity, to rest again. These so-called conflicting forces only come into play when a high degree of expansion is attempted with a single steam cylinder directly connected to the pump; and hence one of the objections to the Cornish engine. To secure the full value of expansion it is necessary to use a fly-wheel, or other heavy moving part, to absorb the excess of power at the early part of a stroke, and give out power at the latter part of the stroke. Steam entering the cylinder of a Cornish engine strikes a blow (so to speak) upon the massive portions of the engine (which are constructed to receive this blow), and gives to the piston a momentum which is accelerated while the steam follows it, and then retarded as the steam expands, until the pressure of steam and weight of the moving parts are in equilibrium at the end of the stroke. Admitting, then, the conflict of forces, does not the value received by expansion more than neutralize any additional cost in the proportioning of an engine?

By using a compound engine and expanding from one cylinder to the other, and constructing the pumps in duplicate, a moderate degree of expansion is obtained with tappet pumps; but this duplication of parts is, in plain words, the construction and maintenance of an entire steam pumping engine in place of a simple and inexpensive fly-wheel, with practically no wear, or expenditure for maintenance.

Very superior engines, and those which rival the Cornish in economic duty, are constructed with compound steam cylinders, bucket and plunger pumps, beam and fly wheel, the compound cylinders in connection with the fly-wheel permitting a high degree of expansion.

Special conditions may make one form of pumping engine more desirable than another, but under ordinary circumstances, where a large volume of water is to be lifted to a considerable elevation, the superiority of well proportioned and constructed pumping machines may be considered to rank as follows for economy:

1. Cornish, or single-acting engines.
2. Compound engines, with fly-wheel.
3. Condensing engines, with fly-wheel.
4. Compound engines, without fly-wheel, duplex pumps.
5. High pressure engines, with fly wheels.
6. Condensing engines, without fly-wheel.

7. High pressure engines, without fly-wheel.
8. Rotary and centrifugal pumping engines.

It is hardly fair to place the rotary and centrifugal pumps among pumping engines requiring to be in constant service under heavy work, but they have been brought so prominently into notice that they deserve mention. The rotary engine and pump possess in theory so many apparent advantages that great ingenuity and much money have been expended in attempts to perfect a reliable apparatus.

One design proposed for mines demonstrated that the inventor had been so impressed with the rotary principle that he introduced obstructions in the delivery part of his pump, which, in connection with wings or blades on the revolving shaft, kept the water in a rotary motion regardless of the fact that all the power expending in rotating the water was entirely lost, so far as lifting it was concerned.

Another inventor constructs his delivery pipe of a series of inclined planes, changing in direction every few feet, under the impression that water will ascend in a zig-zag course with its increase of resistance more readily than in a solid vertical column.

This paper is, however, not intended to discuss particular machines, but only in a general way classes of pumping engines, and the above are introduced as instances of devotion to the rotary class. It is rather the principles of construction with which it is intended to deal, hence there is no reference of comparative duty tests. This I have reserved for future consideration, and shall be pleased to receive records of any pumping engines accessible to the members of the Institute.

In ascertaining the duty or actual commercial value of such an important machine as a large pumping engine, there need be no difficulty in arriving at an exact measure of comparative economy and merit, without resort to hypothesis or guessing at results. All the elements entering into the intelligent understanding of the subject are easily ascertained. They are

1. Fuel actually consumed, with oil, packing, etc.
2. Weight of water delivered×height lifted×friction.
3. Reliability and durability.
4. Attendance and repairs.
5. Comparative first cost.

These facts can all be obtained and the results readily worked out to the satisfaction of any one interested in the operation of pumping engines. In some of the records of empirical tests there seems, however, to have been so much high art and scientific ability displayed that even to those with moderate attainments in mechanical engineering the *modus operandi* of securing the result is a mystery.

It has been claimed that the indicator is the best means of determining the relative value of pumping engines, for it tells the tale of the inside workings of a pump or steam cylinder. Recognizing the value of indicator diagrams, I cannot conceive that they are as valuable in comparing various pumping engines as the record of the coal heap and the discharge weir. Comparisons by indicator diagrams are likely to be unjust unless they are taken with the same or a similar instrument, located in like positions on the various engines, and given in connection with the speed and work performed by the different machines.

The contraction of water-ways, proportion and kind of valve also have a marked effect upon the appearance of cards taken from a pump cylinder.

While indicator diagrams are of great service to the engineer, and their comparison has done much to improve various motors, there are so many affecting causes to be considered that it is difficult to make satisfactory comparisons of the records of different parties. A candid comparison of the elements proposed in this paper will give a just precedence to good engines, and I am convinced will sustain the relative order of merit as given.

DISCUSSION.

The chairman said he was glad to hear this subject brought forward in a place and atmosphere where it could be, he trusted, discussed without passion or the bias of pending personal interests; and he took pleasure in recognizing the strictly professional tone of Mr. Birkenbine's paper, it being well-known that that gentleman's business relations were such as to tempt him to a different style. With reference to the reported high duties of Cornish pumping engines, he begged to refer to an article in the ENGINEERING AND MINING JOURNAL of March 5, 1877, where his views had been expressed. The great excellence of the Cornish engine as a mine-pump was, however, admitted.

THE DIVINING ROD.

TO THE EDITOR: SIR—In a previous number I gave some conclusions regarding the "Divining Rod," and, with your permission, will give a further account of some of its operations, as I have found them.

An acquaintance, an expert with the rod, measures the richness and value of the veins "indicated" by the force exerted on the rod, as compared with the force exerted at a mine he visited, where the ore was of known quality and quantity.

I can understand, from my own experience, that equal attractive power might be exhibited in many places, under a great diversity of conditions. The different forms of chemical action among the different kinds of rocks, and along their lines of contact, are such as to cause galvano-electric currents of considerable intensity. These will cause the rod to act, whatever may be *their* cause.

The well-known property of pyrites and pyritous rocks, to decompose on a large scale in presence of favorable aqueous and atmospheric conditions, give rise to an amount of galvanic energy which is highly favorable to the action of the rod. To this I refer by far the greater number of "indications" of this instrument.

Along lines where a rust or clay strata occurs on the wall of a vein formation, the rod usually gives signs of attraction, but I have yet to see any proof that this attraction is affected any more by presence of ores than by the presence of any other undecomposing rock. I have personally opened on two placers where the rod experts, exploring on their own account probably, had reported "nothing there." In both cases I found perfectly defined veins, but without much decomposed rock. One of these was quite rich in ore, while the other showed no ore for 60 feet of depth.

I have personally investigated the workings at several other places where the rod gave negative results, and found surface and wall decomposition slight, but ore, in some cases, quite abundant. I have never known, personally, of any discoveries of good ore deposits which were first pointed out by the rod.

A highly intelligent gentleman, with whom I have held some conversation regarding the rod, stated to me that with it he had discovered "hundreds of rich mineral veins" in a certain portion of the country. However, in answer to an inquiry as to the richness of the ores, etc., he stated that he "*had not opened any of them yet.*"

Now his expression, above, shows the status of the so-called discoveries of the "Divining Rod." There remains no doubt in my mind but that galvano-electric action along lines of contact, or in presence of decomposing mineral matters or rocks, or even in some cases vegetable matter, is capable of exerting an influence through the human body whereby the currents concentrating in the arms and thence to a connecting link (the rod) show an attraction toward the source of energy. The fact that mineral veins and deposits are, from their very nature and position, frequently localities of the greatest galvanic action, allows a possibility of a valuable deposit of ore being found by the rod, in which case the one success consigns to oblivion the memory of thousands of failures.

The effect of "unconscious cerebration" of the operator, on the motion of the rod, is surprising, and some of its developments would give an impression of fraud, but I am of the opinion that the action is in most cases involuntary.

For instance, a rod was stated by the operator to only indicate certain metals and ores. Samples of these metals and ores were provided, together with others to which the instrument was *not* sensitive, and the rod, on trials, bent down to the samples it was said to be sensitive to, and to no others. In so doing, it bent in such a manner as could not possibly have been caused by the operator. He was then blindfolded, and the position of the samples changed without his knowledge. The rod would point to *any* specimen, but in no case so decidedly as when the operator could *see*.

Again, one of the samples to which the rod was most sensitive was placed under a glass cover (as a non-conductor), and the rod would give no sign of attraction, the operator not being blinded.

He was then blindfolded, and caused to believe that the sample was uncovered (when it really *was* covered by the glass), and a decided attractive force showed itself.

I attribute these results simply to the will-power of the operator, used, it may be, unconsciously, which, while it cannot entirely prevent the passage of exterior galvanic force through the body, can greatly intensify or diminish it, and also to some extent control its action, even outside of the person.

Hence we see that in any continued investigation of the powers of the "Divining Rod," the investigator should be, to an eminent degree, unprejudiced. In scientific investigation generally, the importance of this is fully recognized; but here we have a subject leading to a new and most interesting field to which prejudice has long barred investigation, and which is, from its very nature, more open to effects from personal bias, than any other subject.

I think much useful and most interesting knowledge regarding phenomena of terrestrial electricity and magnetism, and also perhaps in physiology and psychology, might be developed by a careful and unprejudiced study of the operations and powers of this "Divining Rod," so called, which seems to be, simply, a galvanometer, with the human body as one of its constituent parts.

Yours, C. W. KEMPTON,
32 Pemberton Square, Boston, Mass.

MINING NOTES FROM THE MAGNOLIA DISTRICT, COLORADO.

TO THE EDITOR: SIR—This is one of the most promising camps in the newly-discovered tellurium belt which embraces the western half of this, Boulder County. It is eight miles from Boulder City (the county seat), at the foot of mountains, and has an elevation of 2,000 feet above the plains, of which the view is very fine. On the west the snowy range looms grandly up, the highest peaks being most of the time enveloped in clouds. The village is a little over a year old, and is beautifully situated on a gentle declivity of a divide between the mountains. The houses already number over a hundred, and the vote in October was 240.

Our leading mines are the Magnolia, Mountain Lion, Keystone, Little Dorrit, American Eagle, Crœsus, Lady Franklin, Golden Ledge, Sac & Fox, Dunraven, Hero of the West, Sir John Franklin, Poor Man, Susanna, American Flag, Mair Pointon, Snow Flake, Eagle Bird, Downs, Ben C. Lowell, Free Gold, Giant, Little Giant, Alabama, Boulder News, Denmark, Ritter, Lizzie Brown. There are many others we might name, but these are about all that have attained notoriety.

The *Magnolia* is one of the first discoveries in this camp. It has two shafts, the discovery being 68 feet deep, with a drift 40 feet westward and 10 feet eastward, at a depth of 40 feet in good paying ore, which yielded by fire assays as follows, per ton: $18,056.61; $602.94; $209.04; $23.27; $52.64; $59.03; $676.65; $50.09; $66.34; $42.64; $113.75; $129.48; $203.48; $114.75; $23.27; $33.50; a black tellurium streak one inch thick $61,861.93; and an average assay on crevice 3 feet wide of $64.61. By mill-runs $552.24; $20.45; $158.90; $112.10; $1,437.10; $224.46; $86.52; $58.96, and 2½ tons from dump, heretofore considered worthless, $33.31. The other shaft is 23 feet deep, and has also produced some good milling ore. In the bottom is a streak 8 inches thick; an inch and a half of this assays $191.49, the balance $74.30. This mine shows as well at the same stage of development as any mine in the camp, and if worked as extensively as it might be, could be made to pay very largely. The *North* lode is the extension east of the Magnolia, and is being worked vigorously, and with the same amount of development will doubtlessly rival it.

The *Alabama* has a shaft 70 feet deep, with pay-streak 4 inches wide at surface, increasing in width until attaining 14 inches in bottom of shaft, which shows an average yield of $83.33 per ton.

The *Ritter* has a shaft 61 feet deep, with pay-streak 15 inches, showing sylvanite and tellurium in streaks and blotches. We took ore from different parts of this pay-streak and assayed it, which yielded as follows: No. 1, 71 ounces gold, coin value $1,467.57 per ton; No. 2, 22 ounces, coin value $454.74; No. 3, 4 ounces, coin value $82.68; No. 4, 5 ounces, coin value $103.35. This mine is still owned by the prospector who discovered it, one of the pioneer class who rarely ever stop to develop a lode. We regret that it has not passed into the hands of some enterprising, energetic party, who would thoroughly develop it, as we are fully convinced it is destined to become one of the best mines in this great tellurium belt.

The *Snow Flake* has a shaft 31 feet deep, pay-streak 12 to 14 inches, three inches of this being first-class, and yielding, as per assays, as follows: $50, $1,600, $1,824, $2,000 and $3.027 coin value per ton. Work on shaft has been temporarily suspended to run drift on vein, which will intersect the shaft at the depth of over 350 feet. Prof. Wiser, from Georgetown, had a piece of ore from this mine analyzed by Prof. Genth of Philadelphia, who pronounced it calaverite, showing the enormous yield of $230,000 to the ton! Work is now being vigorously prosecuted on this mine, and it will no doubt prove a valuable property.

The *Eagle Bird* is a continuation eastward of the same vein, and the owners

purpose working it through the drift on tunnel now being run on the Snow Flake.

The *Poor Man* has a shaft 75 feet deep. At depth of 60 feet a drift is run eastwardly 40 feet. The crevice has been carrying a vein 4½ feet thick, with sylvanite and other mineral scattered through it. The first-class streak, ranging from 1 to 4 inches, has assayed as follows: $735, $1,241 and $5,060 per ton, coin value. First-class ore has yielded by mill run as follows: $190, $291 and $1,120, with a large body of second-class ore on the dump which, judging from a number of assays made from it, will yield from $50 to $60 per ton. This mine is now being worked night and day.

The *American Eagle* mine a few weeks ago was 60 feet deep, and the owners had let a contract to sink it 100 feet deeper. At that depth it showed a pay-streak of 14 inches, and the mill runs were as follows: $80, $106, $116 and $160.75 per ton coin value.

The *Crœsus* is the eastern extension of this vein, and is also being developed yielding the same character of ore.

The *Lady Franklin* is classed among our best mines, has a shaft over 100 feet deep, and, we are told, is producing good ore. We will not, however, give figures, as we have it only from hearsay.

The *Golden Ledge* has one shaft 47 feet deep, and they are sinking a second. The assays (from first shaft) are as follows: $372, $599.43, $620.10, $960, $1,157.52, $2,193 and $5,070.

The *Mountain Lion* has main shaft 178 feet deep; first level, at depth of 50 feet, runs 170 feet westward; second level, at 65 feet, 76 feet eastward; third level, at 110 feet, 70 feet eastward and 160 westward; fourth and last level, at 170 feet (8 feet from bottom of shaft), 190 feet westward. The pay vein throughout this mine varies from 10 inches to 3 feet in thickness. The first-class streak averages 12 inches thick, and will yield from $600 to $2,200, showing an average yield of about $1,200 per ton. The second class averages about $200 per ton.

The *Keystone* is the extension eastward of the Mountain Lion, and has discovery shaft 210 feet deep. First level, at 45 feet, runs 50 feet westward and 35 feet eastward; second level, at 70 feet, runs 50 feet westward; third level, at 90 feet, runs 90 feet eastward; fourth level, at 165 feet, runs 40 feet eastward; the fifth and last level, at 200 feet, runs 55 feet eastward. The pay vein throughout this mine varies from 3 to 8 feet, and has produced an average of 8 to 10 tons per day of 24 hours. The yield of this mine, though handsome, we are unable to give, as we are not in possession of such authentic data as we would like to furnish. A two-thirds interest in this mine has recently been sold for $50,000. We have many more good mines, some of which we may describe at a future time.

The chief want of this camp now is *greater milling facilities*, our nearest reduction works being at Boulder City, 8 miles distant. The Middle Boulder, which runs through the northern part of Magnolia Camp, affords ample water power all the year round. There is also an abundance of timber, saw-mills, and a good wagon-road leading to Boulder City, the terminus of two railroads. This opportunity for a safe and paying investment is well worthy the attention of capitalists.

We have just learned that the *Melvina*, one of the noted mines in this tellurium belt, has been sold within the past few days for $150,000, and we congratulate the purchaser on his shrewd and valuable investment.

Magnolia, Feb. 28, 1877. BRADFORD & MYERS.

ABSTRACTS OF LECTURES ON MINING.—No. XXXIII.

By Prof. W. W. Smyth, M.A., F.R.S., Royal School of Mines, London.

(From the London "Mining Journal.")

When metallic tubbing is put in, the air rising through the upcast shaft often contains many substances which are apt to corrode iron. The iron then becomes so soft that in some cases you can easily cut it out with a knife, and hence it is incapable of resisting any serious pressure, and several accidents have occurred where the repairs have not been carefully attended to. Various varnishes, etc., have been tried for the purpose of protecting it; most of them are open to objection of one sort or other. Especially this, that if you conceal the whole face of the material you cannot see how it is getting on. A lining of wood has been put in in places where wood is not likely to be injured; in other cases a lining of thin bricks has been introduced, apparently with much success.

Of late years much time has been gained and economy introduced by not being obliged to wait till such time as you get down from the furnace to a firm foundation, but by putting in intermediate wedging curbs at different places and building up from one of them to the other. In some of these cases, where you have unusually large quantities of water, it may be that even an enormous array of steam-engines will not suffice to clear the water and enable the men to get down to put in the tubbing. Under these circumstances many methods have been introduced, especially during the present century. When cast-iron began to come into use a method was introduced for the lining of wells with it, and the process only needed to be enlarged to render it applicable to shafts. A ring of cast-iron is weighted down and pressed into the ground; on it is placed a second ring, and a joint made between them by means of flanges and bolts with lead, or gutta-percha, or other material between; the weighting down is continued, then a third ring is superimposed, and so on. For the purpose of making them sink more readily a process of digging may be carried on at the same time, if the sand or material is tolerably free from water; but if there is much water the material is drawn up by a process known as bagging. The lowest ring is sharpened to enable it to penetrate better, and as soon as this comes into firm ground the water can be pumped out and the shaft proceeded with in the ordinary manner. Many of the wells about London have been protected in this manner, and in some of the mining districts it has been adopted on a large scale. The large circular piers of the new Blackfriars Bridge, tubes of cast-iron 18 feet diameter, were placed in a similar manner: one of these was dropped to the bottom of the river, a second imposed on it, and the joints made by the assistance of divers; successive rings were added, till at last a tower, 60 or 70 feet, was built up, which was sunk till it reached a firm foundation. Another slight modification of this method consists in having an outer margin let down in this manner, then inside of it having another set of rings, to be supported in the ordinary way by curbs, etc. In the neighborhood of a river within the area of its former extension, when you come down to the gravels and boulders, which are apt to be found there, the sharp edges of the lower ring may be broken or bent, or what is worse still, the whole structure may be canted or turned aside, and one or two cases of failure have occured where the tubbing was so canted that it could not be put right again. If not too low down this quicksand could be first secured by plank tubbing, to avoid the risk referred to. In some cases these have been made of wrought-iron, but then the shaft has been generally made as one continuous tube, built up in lifts like a boiler. In these cases, of course, the strength of the metal will have to be proportioned to the pressure it is intended to resist; cast-iron is so much used on account of its enormous strength, combined with its cheapness. In Silesia some years ago the method was successfully adopted of sinking towers of masonry in this manner. A wooden curb, resting on a piece of iron with a cutting edge, formed the base; then on it a pile of masonry, 4 to 6 feet high, was built and crowned by a wooden curb; this constituted one set. The various curbs were strung together by iron rods. At the commencement a small space was excavated and one of these sets placed in and sunk by the pressure of weights, and as it sunk down another set was built on its top, and the two secured by the tie rods. The sinking is generally assisted by men digging out the material from the interior. The great towers on the opposite side of the river, as approaches to the footway of the Thames Tunnel, were sunk in a similar manner to the first described, only on a larger scale and with more brickwork. Solid walls of masonry on a base of iron which had a cutting edge were held together by means of tie rods; these shafts were 60 feet diameter and 40 feet high. The smallest deviation from the vertical would have been troublesome, to say the least, but the sinking was assisted by men digging at the bottom at opposite ends or diameters; or if the ground was harder in one portion, that portion might be excavated. In some instances the hydraulic press has been employed with advantage for forcing down the masonry.

The most novel introduction into the system of sinking in this manner is that brought forward by a colliery engineer, Mr. Friger. He was engaged in sinking some pits in the basin of the River Loire, and in sinking through the alluvial matter formerly deposited by the river he found that it was not at the surface that the sand was saturated with water, but at a depth of 60 or 70 feet near the bottom of the alluvium, and that when once this was got through the sinking was comparatively easy. The upper part could be tubbed by means of a lining, generally of sheet-iron at first; but the tubing could not be forced down, as in the method of pile driving. It suddenly struck him that if the atmospheric pressure was forcing the water into the tub from below, if he introduced a greater pressure into the top the water could be kept back; but the difficulty was to get the men in and out with the materials which they excavated. He effected this, however, by putting an inner tube inside the outer, making it water-tight above and below by means of a stuffing box. This tube has a floor at bottom with an opening large enough for a man to pass through; the roof is similarly provided, so that the tube is divided into three compartments. In passing to the lower or working compartment, or in removing the materials, one of the two doors of the middle compartment is always kept closed, so as to avoid as much as possible the loss of the compressed air. At first it was suggested that it would be incompatible with the men working for a certain number of hours, and it came before the French Academy of Sciences as a question of physics and hygiene. General pressure maintained is 2 to 3 atmospheres, but it has been worked up to as much as 4½. A pipe passing from the lower part to the surface serves for the escape of the water. In one case when they had got down to a depth of 80 feet they could get no further, the water would not rise in the pipe; but then one of the men, making a clumsy blow, hit the pipe, and the water instantly rushed up; in fact, the weight of the column of water was lightened, and they found that by carefully managing the column they could get down to much greater depths. It was said at the time that there was a great loss of life attending the method, and for some time its application in Belgium and Prussia was checked; this, and the serious accidents which the men sometimes met with, show that it cannot be used without great precautions. Among other things it was found that men of unsteady habits suffered far the most seriously from the compressed air; the thoughtlessness of the men, too, in rushing rapidly from the lower chamber to the upper, *vice versa*, instead of staying a short time in the intermediate chamber, caused them great risk. The candles burned very rapidly and with much smoke in the air, causing great difficulty. And another source of accident has been found in the fact that if a powerful blast of compressed air is sent in the whole tube might be blown out, so that now it is commonly the practice to weigh the upper part well.

The tract of country which lies between the coast at Calais and the Westphalian hills is very remarkable in respect of the great extension of the soft measures, which have been referred to in a previous lecture. In the district of Mons many difficulties have been met with, and overcome by the methods already described, while in other cases the engineers have been entirely vanquished. It was under these circumstances that a famous bore-master, G. Kind, about 1850, suggested the idea of boring the shafts down from the surface, like ordinary bore-holes. Several shafts were commenced, from 4 to 5 feet diameter, especially in cases where they had to be put down through alluvium, and where the lining was dropped down by degrees, without stopping to take out the water, with the intention of putting down tubbing when a water-tight joint had in this way been established, and the whole made permanent. But what with pebbles often occurring, and the difficulty of establishing a perfectly water-tight joint, these attempts were not successful. The lecturer did not think the plan would have become a success but for the method of tubbing invented by Mr. Chaudron, who joined Mr. Kind. In 1862 Mr. Chaudron exhibited a plan of his method of excluding water, but in spite of its being eloquently recommended it attracted little attention from the engineers. A few years later it was applied, and the reports were so satisfactory that the lecturer went over to Belgium to see it in operation, and found the method was quite a success, and was carried out far cheaper than the other methods. [A full description of it by Prof. Smyth is published in the Transactions of the Northern Institute of Mining Engineers, 1871.] It is certainly a method which in cases of special difficulty it would be advisable to introduce. The shaft is bored by taking out a central part 4 to 5 feet diameter; first keeping it on 40 to 50 feet ahead, then the main shaft 10 to 15 feet diameter, and in some cases there is a third stage from the surface down to near the watery strata, lined with brickwork. One advantage consists in the smaller number of men employed; there are the master borer and his assistant, who regulate the borer by means of a cross head standing on a stage above the shaft, an engineman and stoker. The cutter for the smaller hole is made of a mass of hammered iron; in the cutter itself the teeth are steel, and are set in sockets in the iron, so as to be replaced if anything goes wrong with them. In addition to the main cutter are two guides above it, which keep it vertical; one of these carries longitudinal, the other horizontal cutters at each extremity; the whole apparatus weighs about 5 to 8 tons. As soon as this smaller hole is carried far enough, and the material withdrawn, the larger borer is used to work the larger bore hole; it has teeth, like the smaller, but set on an inclined plane, so as to cut the base of the shaft sloping towards the centre. A loop in the centre of the borer, which fits into the smaller shaft, serves a guide,

and the pieces of material as they are cut roll down the slope into a kibble placed in the small shaft. A great deal of aptitude is required in the men and the fitting of the apparatus, as will be seen when we find the apparatus weighs no less than 16 tons. After the shaft has been carried down to a certain part comes the most important point—the lining. Where you have the water in the shaft, and consequently no pressure from the outside to force the material in, a shaft will stand which would not stand under the ordinary methods. When a firm foundation is reached new tools are introduced, for the purpose of smoothing the bed for receiving the contrivance which is to secure a water-tight joint. This consists of two rings, the lower flanges of which point outward, while the upper point inward, and are made so that the upper can slide at the back over the lower. A quantity of moss is placed in the outer ring of the lower piece, so that when the upper ring is forced down the moss is compressed, and fills up all the crevices. The rings above are flanged towards the interior, and strung together by rods, and the whole is lowered down by screws and strong iron rods. After that a quantity of concrete is poured down the back, which soon hardens, and so completely that when it has been necessary to remove a segment it has been found that the concrete had kept out the water completely. The tub is of extra strength, cast in entire segments, and put together at the surface (the joints being well leaded), and lowered, and sometimes as much as 140 metres have been thus put down before any of the water is taken out. When the water is stanched out it is a mere matter of pumping to remove that which is in the shaft; then the men go down and make the joint still more perfect by means of a wedging curb, and afterwards the shaft below can be tubbed up to the moss box.

ANNUAL REPORTS OF THE QUINCY, RIDGE, OSCEOLA AND PEWABIC COPPER MINING COMPANIES.—From the annual reports of these companies we make the following extracts showing the mining operations and financial condition of each for the year 1876. These reports are published in full in the Portage Lake *Mining Gazette* of the 15th inst.:

The Quincy Copper Mine.—The following comparative statement for two years will give a very clear view of the operations of this company:

	1875.	1876.
Shipments for the season	3,409,395 lb.	3,815,850 lb.
Yield, per cent	82	80½
Total of ingot copper	2,798,281 lb.	3,073,171 lb.
Total product for the year	3,527,315 lb.	3,661,715 lb.
Product in tons	1,763¾	1,830¾
Of this, stamp copper	3,435,395 lb.	3,531,115 lb.
Mass copper	91,920 lb.	130,600 lb.
Value of product	$652,397 86	$580,295 92
From sales of silver	770 22	930 74
Total value	653,186 08	581,226 66
Running expenses of mine	371,564 02	387,329 15
Building and construction	15,251 43	3,123 30
Other expenses	70,001 21	70,580 03
Total expenses	456,816 66	461,032 48
Actual mining profit	196,351 42	120,194 18
Received from interest on loans	6,716 30	7,117 07
Sales of real estate, Hancock	9,574 09	8,978 72
Total net income for the year	216,964 79	136,289 96
Dividends paid	*220,000 00	†100,000 00
Surplus undivided	485,009 14	401,299 11
Sales of ingot copper, per lb	22·67	20
Tons of rock mined	101,496	98,944
" " hoisted	84,745	84,808
" " treated at rock-house	71,487	74,717
" " from stock rejected	13,258	10,026
Per cent. of mineral in rock	2·44	2·38
Stamp mill in operation	278 days.	280 days.
Cost per ton, stamping and washing.		
Fathoms stoped on contract	4,968½	4,796¼
Yield of mineral, per fathom	591 lb.	629 lb.
Yield of ingot copper, per fathom	485 lb.	507 lb.
Average force employed	504 men.	510 men.
Average number of miners	271 men.	271 men.
Average wages of miners, per man	$46 74	$47 13

* This includes $8 (annual) Feb., 1875, and $3 August, 1875.
† Includes $5 February, 1876, and $3 August, 1876. A dividend of $4 was paid Feb. 15, 1877.

In 1875 it cost the company 91c. to treat each ton of rock in the stamp mill.

The Ridge Copper Mine.—The product of this mine for the year 1876 was:

Barrel copper	176,580 lb.
Mass "	117,855 "
Stamp "	98,030 "
	392,465 lb., or 196,232 tons,

which has realized, including copper on hand and the mineral remaining at the mine at 25 per cent. yield $58,920 80
Received from sale of silver 254 55
" " interest 436 76
Total receipts $59,612 11

The expenditures of the year are as follows:

Mine expenses	$54,866 49
Other expenses, as per treasurer's balance sheet	10,686 76
Total	$65,553 25
From which deduct total receipts	59,612 11
Loss on the business of the year	$5,941 14
Total balance on hand January 1, 1877	$37,356 44

The total expenditures of the company have been as follows:

Real estate—cost of property	$203,541 00
Expenditures, as per published statement, to January 1, 1876	764,833 78
The expenses for 1876 were	64,796 41
Dividend Account—Paid February 24, 1873	$50,000 00
" " 23, 1874	20,000 00
" " 8, 1875	20,000 00– 90,000 00
Miscellaneous	4.785 68
Aggregate expenditures	$1,127,956 87

The total receipts of the company are enumerated as under:
Capital Stock—Paid for property, $200,000; assessments, $200,000; total, $400,000.
Copper Account—Sales to January 1, 1876, $664,379.52; sales in 1876, $49,278.45; total, $713,657.97.
Miscellaneous, $14,098 90; aggregate receipts, $1,127,956.87.
The openings made during the year were as follows:

Sinking shafts	60 feet.
" winzes	124 "
Drifting	511 "
Stoping	697·67 cubic fathoms.
Whole amount of ground broken	856·47 " "

The yield of mass and barrel copper was 344·37 lb. per cubic fathom.

" " stamp copper	105 " " " "
" " amount of rock hoisted	14,400 tons.
" " " selected	1,836 "
" " proportion of stamp rock to rock hoisted	12¾ per cent.
" " " " " mined	11 " "

The number of days worked on Ridge mineral was 87.
The amount of rock stamp was 2,178 tons.
The rock stamped produced 2¼ per cent. of copper.
The total cost, including repairs and transportation of rock to mill, was $1.72¼ per ton of rock.

Average monthly expenses	$4,572 20	Average number of miners	47
" wages miners on con't.	44 62	" number of employés	84⅛

The Osceola Copper Mine gave a product for the year 1876 of 2 405,631 pounds of minerals, equal to 1,202 tons 1,631 pounds, and at 70.40 per cent. gives 1,693,737 pounds of ingot copper, which, at an average of 20.56 cents per pound,

Gives	$348.333 25	Assessment of $2 on 40,000 shares	80,000 00
Silver	847 58		$167,500 22
	$349,189 83	Cost of stamp mill and other improvements, $118,137.35; land purchased, 10,500 00	128,657 35
Running expenses, $247,002 19; other expenses, $51,085.37	298,087 56	Balance Jan. 1, 1877	$38,862 87
Net profit for year	$51,093 27		
Balance assessment Jan. 1, '76	36,406 95		

The Pewabic Copper Mine.—The yield of this mine for 1876 was 726,694 lbs. of mineral, which, at the smelting works, gave us 78·29 per cent. of ingot copper, or 568,995 lbs. Of this 453,750 lbs. have been sold at an average of 20.65 cents. The cost of marketing the same was as follows:

Freight account	$4,255 08	Smelting "	8,370 24
Insurance "	392 84	Commission and copper charges	1,935 20
Or, about 2.62 cents per lb.			

No. of lbs. mineral per fathom	515	Average yield of mineral in ingot	78.29
" " " " ton	32	" number of men employed	182

Cash on hand Jan. 1, 1876	$1,113 77	Cash T. W. Edwards	$2,370 44
" received for stamping for Osceola and Franklin mining companies*	48,313 22	" Loan account	32,783 00
" 562,478 lbs. ingot sold at 21.11	118,723 65	" Interest	232 47
		Total receipts	$203,536 55

Paid Mine Agent's drafts	$156,794 51	Paid Storage account	$52 80
" Interest account	801 50	" Insurance "	392 84
" Loans "	26,463 80	" Expense "	2,983 90
" Smelting "	9,344 58	Cash balance on hand Jan. 1, 1877	478 34
" Commission and copper charges	1,935 20		
" Freight account	4,255 08		
" Profit and loss account, old dividends	34 00	Total expenditures	$203,536 55

Cash on hand Jan. 1st, 1877	$478 34	Drafts outstanding	$17,839 71
148,995, lbs. ingot, in store and transit, at 20c	29,799 00	Loan account	17,283 80
Supplies at mine	17,687 05	Liabilities at mine	10,446 64
Cash "	232 71	Total liabilities	$48,570 15
Bills receivable	3 200 00	Balance of assets	7,701 95
Account "	4,875 00		
Total assets	$56,272 10		

In addition to the above we have expended in fitting and repairing No. 3 stamp	$1,696 91
Also dead work, in sinking and drifting in Pewabic and Concord mines	9,514 50
Extra work in cross-cut south of No. 4 (about)	1,000 00
Also expended for pumping engine, hose, slime tables, drying apparatus, new foundations of mill, rock bin at mine, etc., say	4,000 00
	$16,211 41

* The company stamped for the Osceola Mining Company 32,975 tons of rock, and for the Franklin Mining Company, 3,718 tons. The Osceola Mining Company left the Pewabic mill about the 15th of November last, when the Franklin Mining Company commenced stamping, and are still supplying one head with rock.

NOTES.

TENNESSEE PETROLEUM DISCOVERIES.—We note the statement that oil in large quantities has been found in Dickson county, Tennessee.

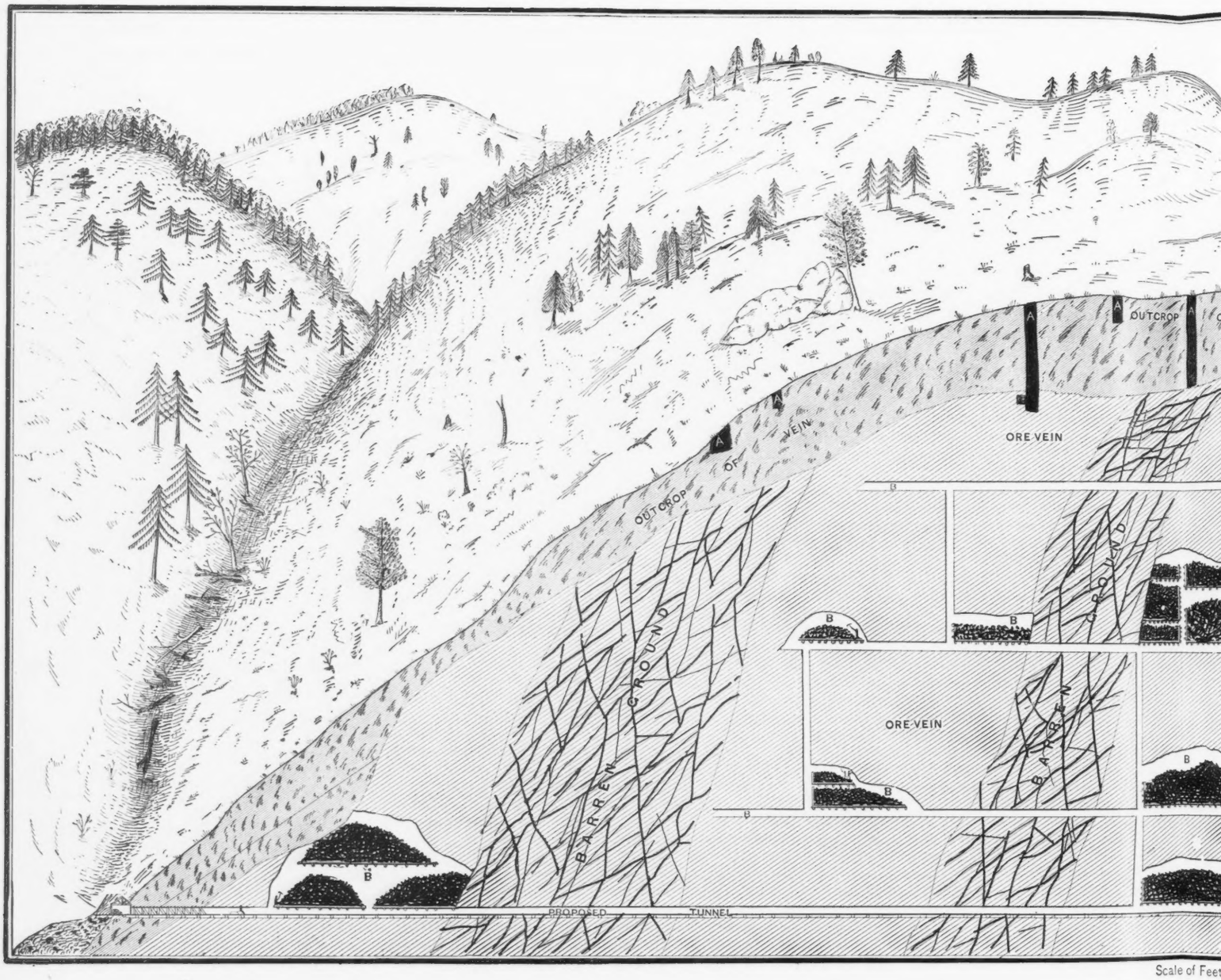
THERE IS A PROJECT ON FOOT IN Virginia City to utilize the hot water pumped from the Savage, Hale & Norcross, and other mines. It is proposed to erect bath-houses, laundries, etc., and negotiations are pending for the control of the boiling fluid.

EMPIRE COAL MINE RAILROAD.—Work has been begun on a railroad from Antioch, Cal., to the Empire coal mine, five miles distant. From Antioch, shipments can be made to San Francisco by water, and at the same place a connection can be made with the Central Pacific's new loop line.

THE BORAX MINES OF SAN BERNARDINO, CAL.—The company working the above mines is making arrangements to mine two hundred tons per month, instead of one hundred tons, as formerly. The company now employs fifty men, and is working some twenty horses. Refined borax is worth about $100 per ton.

CALIFORNIA QUICKSILVER DISCOVERY.—The *San Diego Union* of the 8.h inst. says: "A rich vein of quicksilver has been discovered in Ventura County, not far from San Buenaventura, and a test of the samples by an experienced assayer revealed sixty-three per cent. pure quicksilver. The discoveries have not yet revealed the exact location of their find."

A KANSAS GAS WELL.—A natural gas well within the limits of Wyandotte City, Kansas, on the Wilderman farm, has become one of the Western wonders. It was discovered by a company while prospecting for coal. The company did not value the flow of gas at first, fearing the gas would become exhausted. The company recently completed a large gas tank and gas holder, and as soon as the frost is out of the ground will lay street mains to convey the gas into the city of Wyandotte, and ultimately to Kansas City, Mo. This well furnishes pressure enough to force the gas in any direction desired. It is not only convenient for heating purposes, it proves most excellent for light.



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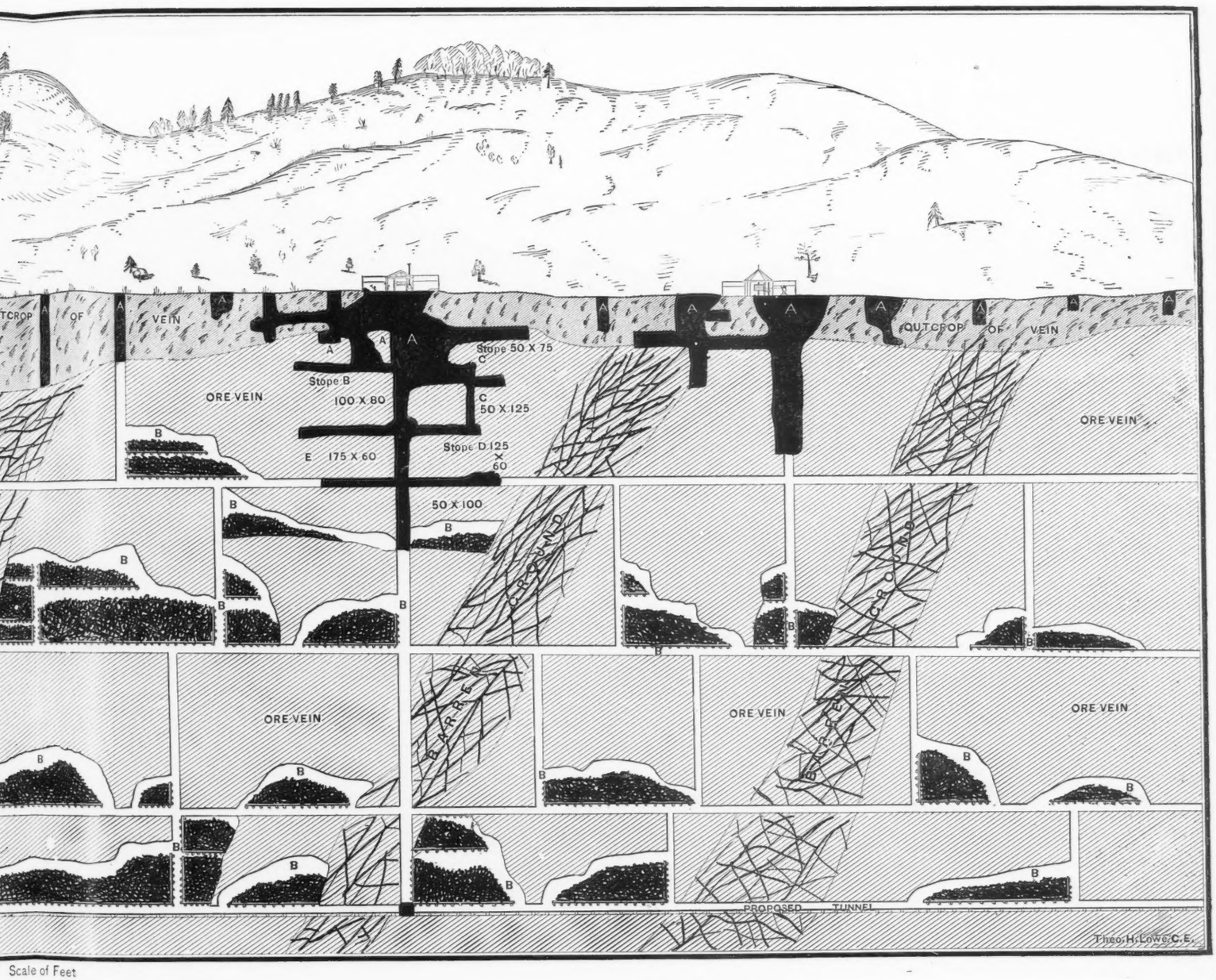

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AND PROPOSED WORKINGS, A. B.

NGS: B PROPOSED WORKINGS.

PETROLEUM REPORTS FOR JANUARY AND FEBRUARY.

	January. 31 days.	February. 28 days.
Stock on hand at the wells	154,175	151,389
Production for the month	796,390	741 412
Daily production	25,690	26,479
Producing wells	6,283	6,441
Drilling wells	457	463
Stock in iron tanks, pipe L. and Refs	2,449,953	2,709,247
Total stock	2.604,128	2,860,636
Total shipments	743 461	484,904

—*Petroleum Reporter.*

NOTES.

THE IRON MILL in progress of construction at Laramaie, Wyoming, has a contract to supply 80,000 tons of rails to the Utah Northern Narrow-Guage road, in addition to a large amount of work for the Union Pacific.—*Railway Age.*

THE CAVE AT THE DIAMOND COAL MINE.—On the 18th inst. about ten acres of ground above the Diamond Mine, at Wilkesbarre, Pa., caved in to a depth of eight or ten inches, while wide seams opened in many places. People living in houses built upon the sinking earth were greatly frightened, but no one was injured. The damage cannot be estimated at present.

SPRINGFIELD, JACKSON & POMEROY (NARROW GAUGE) RR.—Iron for the northern end was to begin to arrive at Springfield, O., by the middle of March, and the ten miles from Springfield southeast to Charleston are to be put in operation during the summer and the coal fields are to be reached by autumn. The grading is also being pushed from the Jackson end toward Waverly.—*Railway Age.*

MENOMONEE IRON RANGE RAILROAD.—Work on this Michigan and Wisconsin road is now being pushed with great vigor, about six hundred men being employed. Clark, Lipe & Co. have a sub-contract for that part of the line west of the Breen mine, and it is thought that the track will be completed to the Quinsaik early next fall—possibly in time for the shipment of some ore before the close of navigation. Negotiations are now in progress looking to the extension of the railway from the Quinsaik across the river to the newly discovered deposits in Wisconsin.—*Railway Age.*

THE WELLINGTON, B. C., COAL MINERS' STRIKE.—With reference to this strike the Toronto *Globe* of 15th inst. says: "Intelligence reached Victoria on the evening of the 26th ult to the effect that the miners of Wellington had refused to allow the new hands from San Francisco to work, and had forced them to leave Wellington. Also, that the mine was on fire, and that unless steps were taken to subdue the fire (which the strikers would not permit) much valuable property would be destroyed. Assistance was dispatched next day, and the Government would probably appoint a commission to enquire into the cause of the troubles."

A WISCONSIN COPPER DISCOVERY.—The *Green Bay Advocate* says: "A copper and silver bearing vein has been discovered on the Wisconsin Central Railroad at Westboro, 83 miles above Stevens' Point, within a mile of the depot, and has been traced for a distance of 11½ miles. The surrounding rock is a black or nearly black trap, and the vein a white quartz. Where discovered the vein is from half an inch to an inch wide, and at a distance of 11½ miles is a foot in thickness, carrying native copper in scales and also silver, as ascertained by an assay. The copper is remarkably soft and may be readily cut with a knife. The vein runs southeast and northwest, and unless where broken in the side of a hill appears to stand perpendicularly. Several hundred pounds of the rock have been removed, but no shaft has been sunk to test the vein beneath the surface.

METALLURGY OF NICKEL.—Some important improvements in the treatment of ores of nickel so as to obtain therefrom nickel, or alloys of nickel, and in the treatment of alloys of nickel so as to obtain nickel therefrom, or to purifiy them from objectionable impurities, have been patented by Sir J. Mason and Mr. A. Parks, of Birmingham. The invention consists in reducing oxidised ores of nickel by means of granulated copper or precipitated copper or native copper in a granular state, such as coro coro, in conjunction with fluxes and carbon, so as to obtain an alloy of nickel and copper, which alloy may be refined either by the wet way or by the method patented by Mr. Parkes in February last. They fuse 1 ton of the finely ground oxidised nickel ore, such as that imported from New Caledonia, with from 1 cwt. to 2 cwt. of native granular copper as coro coro or barilla, or with from 1 cwt. to 3 cwt. of precipitated copper, together with a flux of about 2 cwt. of fluor spar, or 1 cwt. of cryolite, and 2 cwt. of anthracite coal or other kind of carbon. They prefer to melt this mixture in a reverberatory furnace, constructed according to Mr. Parke's invention of March, 1875; but they do not limit themselves to any particular form of furnace.—*Iron.*

NORTH SHORE, LAKE SUPERIOR.—Under date March 1st, a well-informed correspondent writes from the North Shore, Lake Superior, as follows:

Duncan—This mine is reported to have struck silver in the bottom of the workings, but the report is not generally credited, partly because it is rumored that the employés had received "silence" orders.

Silver Islet gives as yet no very encouraging reports, though a belt of plumbago had been passed through with the diamond drill, but no silver was found. While passing through the plumbago rock the indications were thought to be very favorable.

17 *K*—The shaft, upwards of 100 feet deep, has been put down as far as will pay by hand power. The cross-cuts, aggregating 38 feet, have been put out to prove the vein, which, although wide, is unsettled. There are about 25 feet of decomposed wall-rock, charged throughout with branches ranging from 2 to 10 inches in width. When these branches unite, which they undoubtedly will in depth, there is no doubt there will be a fine lode.

Pigeon River—A good deal of excitement is anticipated in the spring with regard to the developments in this region. It is believed that this district is rich in mineral, and will be more judiciously managed than some of the older mines of this region.

Thunder Bay is partly open, and the season is the mildest within the recollection of the oldest inhabitant.

SOLID WATER.—Professor Guthrie, F.R.S., gave a lecture on Friday evening at the Royal Institution on "Solid Water." He began with the remark that those things which are in their nature most abundant, are, in fact, the most exceptional. After a few other illustrations, he pointed out that water, which is so very common, is unusual, and shows egregiousness in its properties. Cast radiant heat on it, it arrests that heat; apply heat and it not only conducts it, but is pre eminent among compound elements as a conductor. Drops of water are the largest of drops of any fluids, and hold together longest. It reflects light least. Water may be solid from the abstraction of heat, and in association with other bodies it may become solid. In the latter case it is only conventionally called solid, and it might be better to call it fixed. It was especially the "fixing" of water in compounds of water and salts that formed the subject of the lecture. About two years ago Professor Guthrie proposed the term cryohydrates for the hydrates of those crystalline bodies which can exist solid only at a temperature below the freezing point of water. The study of the cryohydrates opens up a wide field of research of which we are but yet on the threshold. A number of experiments were shown and tables of results so far obtained in working with different compounds were exhibited. The actual production of the cryohydrates of bichromate of potash and sulphate of copper was shown on a small scale between sheets of glass in front of a lantern, the gradual growth being watched on the screen on which the images were projected. We can hardly yet tell to what practical uses these studies may lead, but this is already seen, that while the cryohydrate of common salts usually used as a freezing mixture maintains a temperature of 22° C., there are other cryohydrates that maintain a lower temperature. Speaking of the paleocrystic sea, Professor Guthrie said he ventured to predict the proportions of the salts there will be found different from what they are in other oceans. One fact not accounted for before that these studies have explained is that at 37° C. a mixture of four molecules of water and one of alcohol becomes solid, but that a mixture either stronger or weaker will not solidify. This explains why the rum of some whaling ships will freeze, and of others it will not. It depends on its strength. In conclusion, Professor Guthrie spoke of the importance of a careful study of the effects caused by slight differences even in common objects.—*Iron.*

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending March 17.

Tons of 2,240 lb.	1877. Week.	1877. Year.*	1876. Week.	1876. Year.*
Wyoming Region.				
D. and H. Canal Co.	31,527	389,367	19,663	272,042
D. L. and W. RR. Co.	31,974	384,734	6,948	212,541
Penn. Coal Co	23,018	171,520	—	179,259
L. V. RR. Co.	21,189	192,059	11,945	132,227
P. and N. Y. RR Co.	634	9,043	—	3,952
C. RR. of N. J.	26,225	237,694	1,071	116,745
	134,576	1,384,417	59,627	916,766
Lehigh Region.				
L. V. RR. Co	39,744	457,247	11,098	244,602
C. RR. of N. J.	29,258	218,179	2,974	142,039
D. H. and W. B. RR.	—	4,267	978	7,647
	69,002	679,693	15,050	394,286
Schuylkill Region.				
P. and R. R. RR. Co.	84,187	750,776	17,417	305,365
Shamokin & Lykens Val.	4,474	73,370	5,510	40,148
	88,661	824,146	22,927	345,513
Sullivan Region.				
Sul. and Erie RR. Co.	424	2,602	1,248	12,127
Total	292,663	2,890,858	78,852	1,668,692
Increase	213,811	1,222,166	—	—
Decrease	—	—	—	—

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent. of the whole production.

Receipts of Coal at Boston, for the week ending March 16, and years from Jan. 1.

Tons of 2,240 lb.	1877. Week.	1877. Year.	1876. Week.	1876. Year.
From				
Alexandria and Georgetown	—	1,290	—	4 162
Philadelphia	5,516	51,179	3,000	33,438
Baltimore	1,928	15,602	1,018	15,512
Other places	1,914	35,121	770	31,570
Great Britain	—	707	—	1,866
Nova Scotia	—	—	—	199
Total	9,358	103,907	4,788	86,687

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 78,340 tons, as compared with the corresponding period in 1876.

Belvidere Delaware RR. report, for week ending March 17.	Week.	Year 1877.	Year 1876.
Coal for shipment at Coal Port (Trenton)	—	—	1,645
" " " South Amboy	12,686	108,617	87,023
Coal for distribution	2,456	33,800	21,778
Coal for Company's use	1,130	15,649	11,384

Perth Amboy business: Tons.

Received for the week	19,008
Shipped for the week	20,549
On hand March 17	152,911

The Exports of Coal from Baltimore for the week ending March 16 were 1,718 tons, and since Jan. 1st, 4,605 tons, as against 8,236 tons for the corresponding period of 1876.

The Production of Coke for the week ending March 7.

Tons of 2000 lb.	Week.	Year.
West Penn. RR	2,373	17,716
Southwest Penn. RR	11,366	115,647
Penn. & Westmoreland Region, Penn. RR.	1,462	15,808
Pittsburgh, Penn. RR	2,244	31,113
Total	17,415	180,284

The Production of Bituminous Coal for the week ending March 17 was as follows:

Tons of 2,000 lb., except where otherwise designated.

Cumberland Region, Md.	Week, Tons.	Year, Tons.
Tons of 2,240 lb	2,899	111,215
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	7,395	81,798
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	4,025	29,302
*East Broad Top	1,380	8,336
Clearfield Region, Pa.		
*Snow Shoe	812	10,267
*Tyrone and Clearfield	25,619	231,906
Allegheny Region, Pa.		
*Pennsylvania RR	3,702	34,732
Pittsburgh Region, Pa.		
*West Penn. RR	2,823	35,933
*Southwest Penn. RR	1,070	11,887
*Penn. & Westmoreland gas coal, Pa. RR.	10,686	162,544
*Pennsylvania RR	6,634	70,013

*For the week ending March 7.

COAL TRADE REVIEW.

NEW YORK, FRIDAY EVENING, March 23, 1877.

Anthracite.

The Pennsylvania Coal Company's auction sale took place on Tuesday, according to previous announcement. There was a very large attendance, and prices show but a small decline as compared with the previous sale. The following quantities were sold at the annexed prices, comparisons being made with the previous sale upon the basis of delivery from Newburg:

Tons.		March 20.	Feb. 28.
42,000	Lump	$2 70	.....
21,200	Steamer	2 19½	$2 62½
40,800	Grate	2 74½	2 57½
26,550	Egg	2 71½	2 72½
89,400	Stove	3 17¼	3 29¾
20,425	Chestnut	3 03¼	2 98
5,000	Pea	2 35	.....

245,375

The Delaware, Lackawanna & Western Railroad Company will sell at public auction on the 28th inst. 100,000 tons of its coal. For further particulars see advertisement in another column.

Again we have the rumor of Combination. Our views on this subject are so well known to our readers that we do not deem it necessary to repeat them now. On Wednesday, at the invitation of Mr. Dickson, President of the Delaware & Hudson Canal Company, the several large mining and coal-carrying companies were represented at a meeting held in this city for the purpose of discussing plans intended for the general good of the companies represented, and the feasibility of a Combination to regulate production to the requirements of the market. From the best information obtainable we learn that the meeting was quite harmonious—in other words, the gentlemen did not lose their tempers—and that they adjourned until the 29th inst., when it is expected that Judge Packer, who was ill at the time of the last meeting, will be present. Judge Packer has hitherto avoided the meetings of the presidents, being represented by other officers of his company. As to him is laid the failure of the late Combination, and as he is charged with avoiding the fulfillment of engagements made by his representatives, by denying that he had made the promises himself, it is questionable whether the other

companies will listen to plans for another Combination until he shall first express a personal desire to enter into the arrangement. If this point were reached the prospects of re-organization would still be no greater than they have been for months. It is said that the Philadelphia & Reading Coal & Iron Company has sold about 700,000 tons of coal to be delivered during the season. Such being the case this company could derive, on the remaining competitive business, but little, if any, profit from higher prices under a restricted tonnage, which would inevitably result in increased cost of production, while its good work of opening foreign markets, which is progressing favorably, would have to be abandoned. The tonnage of the railroad has increased since January 1, as compared with the corresponding period of 1876, about 150 per cent. If an increase of 40 per cent. could be established for the whole year, the low prices now being received for coal and freights would enable the company, according to its own figures of cost, to meet all its fixed charges and gradually extinguish its floating indebtedness. The financial embarrassment brought upon this company by high prices and combination are well known and fully appreciated, and the lessons of the past point clearly enough to an unrestricted tonnage at low prices, as the true policy for the future. There is no doubt that if this policy be followed, the Reading Company will prove a most formidable rival and standing danger to some of the other companies, hence the great anxiety shown by them to bring about a combination that will make the rival impotent. That some of the Wyoming companies fear the Reading is also indicated by the fact that they are reported to have recently sent agitators into the Schuylkill Region (paying them $50 a night), with the object of inducing the miners of that district to strike; but the effort was fruitless, and has been abandoned. It is well known that the long strike of 1875, during which the Lackawanna companies were reaping a golden harvest, while the Schuylkill, Lehigh, and Wilkes-Barre Companies were losing largely by the strike, was kept up by this means. This action will doubtless strengthen the feeling of distrust that is one of the greatest impediments to combination.

The large reduction in wages which has been announced in the Wyoming Region will undoubtedly be submitted to by the men, and no strike of any importance will occur. The workmen are in very straightened circumstances, thousands being in actual need of food, yet the proposed wages, if not accompanied by full work, will not be sufficient to provide the most modest livelihood. A further exodus of miners towards the western mining regions must still be the hope of those who have the good of the men in view, for there is no prospect of full work for some months to come in this field, though much more coal will certainly be mined this year than was put out in 1876.

The production for the week ending March 17 was 292,663 tons, as against 318,390 tons for the previous week, and 78,852 tons for the corresponding week of 1876. The total tonnage from January 1 was 2,890,858 tons, as against 1,668,692 tons for the like period of last year, showing an increase this year of 1,222,166 tons.

A. S. Swords quotes Pittston coal as follows: Lump and steamer, $2.80; grate and egg, $2.85; stove, $3.30; chestnut, $3 25; pea, $2.60. These prices show a considerable reduction from his circular dated March 5.

Bituminous.

There is a little more business being done in these coals. The price for Cumberland coal f. o. b. Georgetown has been fixed at $3,25 per ton. With freights at say $1.40 discharged in New York, these coals are brought in strong competition with Clearfield coals in this market. The Pensylvania Railroad continues its old rates of freight. The Baltimore and Ohio Railroad has not announced rates for shipment from Baltimore, but to compete with shipments from Georgetown a reduction will have to be made. The miners in the Cumberland region have submitted to the reduction demanded and have resumed work on the basis of 50c. per ton for mining.

The Cumberland *News* of the 21st inst. says:

"Official notice was given yesterday that the canal would be opened for business this morning. At the same time it transpired that the tolls would be increased two cents—or from 46 to 48 cents per ton, the increase having been put on for 'terminal facilities' at the outlet lock. We are not advised whether this increase will apply to all coal shipped to tide-water or only that going through the outlet lock."

Gas Coals.—A very important arrangement, as affecting this article, has been consummated during the week. The Baltimore & Ohio and the Pennsylvania Railroad Companies have at last come to an agreement upon rates of freight on gas coals, and have decided upon the markets in which the coals passing over their respective lines shall be disposed. The combination is upon the basis of one-third of the whole business to the former (B. & O.), and two-thirds to the latter road (P. RR.). The coals coming over the Baltimore & Ohio Railroad, with the exception of 90,000 tons mined on its main line, are to be excluded from the markets between Delaware Bay and Cape Cod, while coals shipped over the Pennsylvania road are to be confined to the markets within this limit. The Youghiogeny coals are to be entirely excluded from the New York market. The prices of gas coals will probably be $5 per ton at Baltimore, $5.10 at Philadelphia, and $6 here. This arrangement is likely to be exceedingly unpopular with many shippers and all consumers. It will be found that the business for the year will be very small, and as it is said that the Pennsylvania Railroad Company has guaranteed that the Baltimore & Ohio Railroad Co. shall have a business of at least 300,000 tons of gas coal, the latter company will very likely have much the best of the bargain in this item. As the arrangement covers also the oil and other trades, it would appear that the Pennsylvania Railroad Company has given away a portion of an unprofitable business in coal to secure more substantial advantages in another direction. The gas companies are, as a rule, well supplied with coal, and will do all in their power to break this agreement. This is already indicated by the numerous inquiries made for Newcastle and provincial coals, either of which can be laid down here in large quantities at about $4.50 currency. Although these coals may not be equal to the domestic coals, yet, with a difference of $1.50 per ton in their favor, they can be used with an enricher—to be obtained from the Kanawha region—with economy. These roads are not more likely to make a success of their combination than the anthracite carrying companies were of theirs. And so far as we can see, the combining companies will find this arrangement an injurious one; but while it lasts it will be of great service to the Kanawha region (Chesapeake & Ohio RR.) and to the Nova Scotia mines.

The Philadelphia & Reading Railroad Company, under date of the 16th inst., has issued the following circulars:

FREIGHT AND TOLL COAL TARIFF ON MAIN LINE.
Taking effect from March 12.

STATIONS.	FROM Pine Grove.	Tamaqua.	Schuyl. Haven.
MAIN LINE.			
To Ringgold	....	$0 50	....
" Landingville	....	....	$0 50
" Auburn	....	....	54
" Port Clinton	$0 91	86	71
" Hamburg	94	89	74
" Shoemakersville	96	91	76
" Mohrsville	97	92	77
" Leesport	98	93	78
" Tuckerton	99	94	79
" Reading	1 00	95	80
" Exeter	1 10	1 05	90
" Birdsboro	1 12	1 07	92
" Monocacy	1 13	1 08	93
" Douglassville	1 15	1 10	95
" Pottstown	1 18	1 13	98
" Limerick	1 22	1 17	1 02
" Aramingo	1 23	1 18	1 03
" Royer's Ford	1 23	1 18	1 03
" Phœnixville	1 26	1 21	1 06
" Perkiomen Junction	1 28	1 23	1 08
" Valley Forge	1 29	1 24	1 09
" Port Kennedy	1 30	1 25	1 10
" Port Kennedy Railroad	1 30	1 31	1 16
" Bridgeport	1 33	1 28	1 13
" Rambo's	1 34	1 29	1 14
" Swede Furnace	1 34	1 29	1 14
" West Conshohocken	1 35	1 30	1 15
" Egbert's	1 37	1 32	1 17
" Mill Creek	1 38	1 33	1 18
" West Manayunk	1 40	1 35	1 20
" West Falls			
" Nicetown			
" Belmont			
" Philadelphia	1 45	1 40	1 25
" Richmond			

SCHUYLKILL CANAL TOLLS.
Taking effect from March 12.

STATIONS.	FROM Schu'l-kill Haven.	Port Clinton.	STATIONS.	FROM Schu'l-kill Haven.	Port Clinton.
To			To		
Orwigsb'g L'd'g.	46	40	Port Providence.	52	46
Hamburg	46	40	Pawling's Dam.	53	47
Mohrsville	46	40	Valley Forge	54	48
Althouse's	46	40	Port Kennedy	55	49
Reading	46	40	Norristown	56	50
Birdsboro	47	41	Bridgeport	56	50
Monocacy	48	42	Plymouth Dam.	58	52
Port Union	49	43	Conshohocken	60	54
Pottstown L'd'g.	50	44	Spring Mill	62	56
Lawrenceville	50	44	Manayunk	65	59
Royer's Ford	50	44	Philadelphia	70	64
Phœnixville	50	44	New York	1.20	1.14

No premium will be allowed for prompt unloading.

The above rates are for Schuylkill Canal tolls alone, except those for New York, which include the tolls on the Delaware & Rariton Canal and the towing between Fairmount and Bordentown, and between New Brunswick and New York. No deduction will be made from these rates to free boats, and the company will postpone the collection of installments on leased boats for the present.

The charge will be per ton of 2,240 pounds. No charge less than for y cents per ton will be made for any distance.

SCHUYLKILL CANAL FREIGHT.

The following rates of freight on Anthracite Coal carried on the Schuylkill Canal, in boats of the Philadelphia and Reading Railroad Company, will take effect from March 12th, 1877, and so continue until further notice:

STATIONS.	FROM Schu'l-kill Haven.	Port Clinton.	STATIONS.	FROM Schu'l-kill Haven.	Port Clinton.
To			To		
Orwigsb'g L'd'g	25	20	Bridesburg, add	45	40
Hamburg	26	21	$10 per boat		
Mohrsville	26	21	Beverly, N. J.	60	55
Althouse's	26	21	Florence, N. J.	60	55
Reading	28	23	Bordentown, N.J	62	57
Birdsboro	30	25	Trenton. N. J.	70	65
Monocacy	30	25	New York	80	75
Port Union	33	28			
Pottstown	33	28	Cooper's C'k. N.J	50	45
Lawrenceville	33	28	Up Darby Creek	....	....
Royer's Ford	35	30	S. Morton & Son,	60	55
Phœnixville	38	33	Up Ridley Creek		
Port Providence,	38	33	to near its m'th.	60	55
Pawling's Dam.	38	33	To Chester-to all		
Valley Forge	40	35	points below RR	60	55
Port Kennedy	40	35	To Chester Creek		
Norristown	42	37	—Hospital	65	60
Bridgeport	42	37	To Chester Creek		
Plymouth Dam.	42	37	Crozier's	70	65
Conshohocken	42	37	To Wilmint'n, Dl.	60	55
Spring Mill	42	37	" Brandywine	65	60
Manayunk	45	40	" Newport, Del.	70	65
Philadelphia	45	40	" New Castle, "	65	60
			" Delaware City	90	85
			" Salem, N. J.	95	90
			" Bridgeton, N.J	1.40	1.35
			" Odessa	....	....
			To Port Dep. Md	....	....
			" Baltimore	....	....

The above rates are exclusive of the cost of unloading.

Circular No. 4.

Until further notice, no charge will be made for shipping anthracite coal at Port Richmond, but all pea and dust coal will be retained by the Company on account of shipping expenses.

Circular No. 5.

Until further notice, and at the option of the shipper, the main line freight and tolls upon all anthracite coal shipped from Port Richmond, wherever consigned, will be one-third of the price at which the said coal is sold on board at Port Richmond: provided, the minimum rate of freight and tolls shall not be less than one dollar per ton on stove coal, and ninety cents on all other sizes: and provided that the regulations to be issued by the secretary, relative to the adjustment of freight and tolls under this circular, be fully complied with by the shipper.

Circular No. 6.

If any contracts are made, in writing, with manufacturers and consumers, for the sale of any size or sizes of anthracite coal, other than egg and stove sizes, and the coal so sold is shipped from Port Richmond prior to December 1, 1877, the main line freights and tolls on such coal will be at the option of the shipper,—one-third of the price at which said coal is sold on board at Port Richmond, and no shipping charges will be made on the same; provided, the minimum freight and tolls shall not be less than ninety cents per ton; and provided the contracts are filed in the office of the company before the thirtieth day of April next, and that the regulations to be issued by the secretary relative to the adjustment of freights and tolls under this circular to be complied with; and provided further that upon the filing of any such contract, the company shall have the exclusive right of determining whether the vendee is or is not a manufacturer or consumer within the meaning of this circular.

Circular No. 7.

Until further notice, and at the option of the shipper, the freight and tolls upon anthracite coal by canal from Schuylkill Haven to New York Harbor, to points upon the Hudson River, or to points upon the Long Island Sound, will be one-half of the price at which said coal is sold alongside at the point of delivery, exclusive of the charge of towing from New York City: provided the net rate of freight and tolls, exclusive of towing from New York City as aforesaid, shall not be less than one dollar and seventy-five cents per ton, and that if the coal is sent in private or leased boats, no higher rate of freight will be taken into account than then current in Company's line boats: and provided that the regulations relative to the adjustment of freight and tolls under the circular to be issued by the secretary are complied with.

Circular No. 8.

If any contracts are made, in writing, with manufacturers and consumers, for the sale of any size or sizes of anthracite coal, other than egg and stove sizes, and the coal so sold is shipped from Schuylkill Haven by canal, prior to December 1st, 1877, and consigned to any points in New York Harbor, on the Hudson River, or on Long Island Sound, the freight and tolls on such coal will, at the option of the shipper, be one-half of the price at which the coal is sold alongside at the point of delivery, exclusive of the towing charge from New York: provided the net rate of freight and tolls,

exclusive of the towing from New York as aforesaid, shall not be less than one dollar and seventy-five cents per ton, and that if the coal is sent in private or leased boats, no higher rate of freight will be taken into account than then current in company's line boats; and provided further, that the contracts are filed in the office of the company before the thir tieth of April next, and that the regulations relative to the adjustment of freight and tolls under the circular to be issued by the secretary be complied with; the company reserving the right of determing whether the vendee is a manufacturer or consumer within the meaning of this circular.

Circular No. 9.

Shipments under season contracts registered under the provisions of circulars Nos. 6 and 8, can be made at the option of the shipper, either by railroad or canal.

Circular No. 10.

On and after Monday, March 26th, 1877, a charge of *fifty cents* per four-wheel car, and *one dollar* per eight-wheel car per day will be made on all cars of anthracite coal not unloaded on the day of delivery at Port Richmond, and, in addition to this charge, the number of cars so standing unloaded will be deducted from the pro-rata distribution of empty cars to the colliery from which said unloaded cars were shipped.

We have received, too late for publication this week, Circular No. 7, relative to drawbacks on coal.

New York and Philadelphia.

Wholesale Prices of Anthracite Coal f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Weehawken	2 95	2 95	2 95	3 00	3 60	3 35
Wilkesbarre at Port Johnston	3 00	3 00	3 00	3 10	3 65	3 25
Plymouth, R. A.	....	....	3 00	3 10	3 75	3 35
Susque: Coal Co., (S.H. Brown & Co.,) at Amboy	2 80	2 80	2 80	2 95	3 50	3 20
Kingston at Hoboken	2 85	2 85	2 90	3 00	3 60	3 25
Pittston at Newburgh:						
A. S. Swords	2 80	2 80	2 85	2 85	3 30	3 25
Penn. Coal Co.	3 10	3 10	3 10	3 20	3 60	3 25
Lehigh Coals.						
Old Company at Port Johnston	3 75	....	3 25	3 25	3 65	3 25
Old Company's Room Run "	3 75	....	3 25	3 25	3 65	3 25
Sugar Loaf, Hobok. & Amb. "	3 75	....	3 25	3 25	3 65	3 25
Lehigh Coal Exchange "	3 75	....	3 25	3 25	3 75	3 50
Honey Brook Lehigh	3 75	....	3 25	3 25	3 65	3 25
Beaver Meadow at South Amboy	3 75	....	3 25	3 25	3 65	3 25
Mount Pleasant at Hoboken	3 75	....	3 15	3 15	3 50	3 30
Cross Creek at Elizabethport	3 75	....	3 25	3 25	3 75	3 25
Schuylkill Coals at Port Richmond, Philadelphia.						
Schuylkill white ash	2 75	2 75	2 60	2 65	3 25	2 75
Schuylkill red ash	....	....	....	2 75	3 35	2 75
Lorberry	....	....	3 60	3 60	3 60	3 00
Lykens Valley	....	....	4 15	4 15	4 15	3 30

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

Per ton.

Freight from Hoboken and Weehawken to New York ....35c.
" " Elizabethport & Port Johnston to N. Y.....35c.
" " South Amboy to New York. .....35c.

Freight by the boats of the companies from Hoboken, Rondout, Port Johnston, Weehawken, South Amboy and Perth Amboy to New York City and vicinity 50c.

Pittston coal at New York or Brooklyn delivered by Penn. Coal Co.'s boats 60c. per ton additional.

Lackawanna coal delivered to carts in New York or Brooklyn, 50 cents per ton additional.

Wholesale Prices of Bituminous Coal.

Manufacturing and Steam Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Cumberland, at Georgetown and Alexandria, Va	3 25@....	4 65
Cumberland, at Baltimore	3 65@3 70	5 00
Clearfield f.o.b. Canton, Baltimore	3 50@....	5 00

Pennsylvania Semi-Bituminous Coals.

At the mines, per 2,000 lb., 90c.@$1 f.o.b. at Greenwich, Phila., for Eastern and foreign shipments, per 2240 lb. $3 25@3 35 for Sound ports, 3 50@3 65, f.o.b., at South Amboy, N. J., per 2,240 lb., $4 10@4 75. Discharged, in New York, per 2,240 lb., $5 00 @5 15.

Foreign Gas Coals.

	Sterling.	Am. currency
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel " "	42/	18 00
" Gas Cannel " "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S.	1 75	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$3 90	$4 20	$3 90
Lackawanna coal, in yard	3 50	4 00	3 90
Wilkes-Barre, delivered	5 00	5 30	4 60
Lehigh & Locust Mountain, del'd..	5 50	5 50	5 00
Schuylkill Red Ash, del'd	5 25	5 50	4 75

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$18 00
Liverpool House Cannel " " " "	18 00
American " " " "	11 00
Cannelton Block, or splint, " " "	10 00
American Orrel " " "	11@14
Red Bank Cannel " " "	10 00
Cumberland " " "	00

Baltimore, Md. March 20, 1877.

Specially Reported by Messrs. E. STABLER & Co.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Boston" Vein, and Plymouth White Ash.

In cars at depot.		In cars at depot.	
Lump	$3 85	Egg	$4 10
Steamboat	4 10	Stove	4 60
Broken	4 10	Nut	4 10

Shamokin, red or white ash.

Egg	4 30	Stove	4 60

Lykens Valley, red ash,

Egg and stove	5 35

From wharf or yard, wholesale, 50@75c. additional.
By retail, all kinds and sizes, per 2240 lb. ..... $6 00@7 50

BITUMINOUS.

George's Creek, Cumberland f. o. b. at Locust Point	3 75@4 00
West Virginia Gas f. o. b. at Locust Point	4 50
Youghiogheny Gas, f. o. b. at Locust Point	4 50
Swanton	4 00

Boston, Mass. March 17, 1877.

Coal is dull and easier. The high prices obtained at the New York auction last week are now admitted to have been the result of wash sales made for the purpose of keeping up the stocks of the coal-carrying companies. The consequent weakness and uncertainty in the coal market are greater than would have been the case had prices been left to seek their own level. In addition to this influence has been that of the definite abandonment of all attempts at a coal combination, which became evident when the Pennsylvania Coal Company announced its auction sale for the 20th of 225,000 tons of Pittston coal.

We quote Boston wholesale price as follows:

Anthracite, broken	4.50@4 75	Cannel, English	16.00
do egg	4.50@4.75	Do. Buckeye	10.00
do stove	5.00@5.25	Lingan	4.75@5.00
Cumberland	5.75	Pictou	5 50
Clearfield	5.25	Penn	6.25
Westmoreland	5.50	Youghiogheny	5.00@6.00
Caledonia	4.50@4 75		

—*Commercial Bulletin.*

Cincinnati, O. March 21, 1877.

Specially reported by the Consolidated Coal and Mining Co.

	Per bush.	Per ton 2,000 lb.
Youghiogheny lump afloat	7@7½c.	$1 94
" nut "	6c.	1 62
" slack "	5c.	1 32
Camden, W. Va. "	6c.	1 67
Kanawha, "	7@7½c.	1 94
Delivered to consumers 4 c. per bush. more than above prices.		
Peytona cannel "	15c.	4 26
Youghiogheny coke "	4½c.	2 25
Youghiogheny lump delivered	12c.	3 33
" nut "	10c.	2 75
" slack "	7c.	1 89
Camdem, W. Va. "	10c.	2 78
Peytona cannel "	18c.	5 14
Kanawha "	12c.	3 33
Youghiogheny coke "	8c.	4 00
Wilkes-Barre Anthracite delivered, all sizes	—	8 00
" " on cars "	—	6 70
Schuylkill, delivered		8 00
Lehigh anthracite delivered	—	8 50
" " on cars	—	7 50

Indianapolis, Ind. March 20, 1877.

Specially reported by Messrs. COBB & BRANHAM.

Wholesale on board cars, and retail delivered to consumers.

Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

White River, per ton	$2 75	Peytona cannel, per ton	$5 75
Brazil Block, "	2 75	Indiana Cannel	4 50
Highland, grate, "	2 50	Hocking Valley	4 25
Block coal, nut, per car	18 00	Youghiogheny	4 50
Highland " "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$6 70	Nut	$6 70
Egg	6 70	Stove	6 70

Lehigh Anthracite.

Broken	$7 60	Nut	$7 30
Egg	7 60	Stove	7 70

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8c.
White River	13	" Slack, "	7
Brazil Block	13	Peytona Cannel	—
Highland grate	12	Virginia "	27
Block Nut, domestic use	11	Youghiogheny	16
Highland Nut, " "	11	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	14c.	Lump	12c.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes)	$7 50 per ton.
Lehigh, retail	8 50 per ton.

Louisville, Ky. March 20, 1877.

Specially reported by Messrs. BYRNE & SPEED.

WHOLESALE.

per bushel		per bushel	
Pittsburg	6½c.	Pine Hill	—
Raymond City	6½c.	Kentucky	7c.

RETAIL.

per bushel		per bushel	
Pittsburgh	10c.	Peytona Cannel	18c.
Raymond City	10c.	Buckeye "	
Pine Hill	13c.	City-made Coke	8c.
Kentucky	9c.	Anth., per ton, $10 00 to 10 50	

Screened Pittsburgh per load $3 50
Screened Raymond City 2 50
Pine Hill (Kentucky) 2 25
Cannel 4 50
City-made Coke 4 00

Milwaukee, Wis. March 20, 1877.

Specially reported by Messrs. R. P. ELMORE & Co.

Retail price per ton of 2000 lb.

Lehigh Lump	$ 8 00	Briar Hill, select	$7 00
Lehigh Prepared	9 00	Blossburgh	7 00
Lackawanna (all sizes)	8 00	Cannel	6 00
Pittston	8 00	Pittsburgh	6 50
Scranton	8 00	Oak Hill	6 00
		Steam coal	4@5 00

New Orleans, La. March 19, 1877.

Specially Reported by Messrs. C. A. MILTENBERGER & Co.

Pittsburg coal, wholesale, by boat-load, per bbl	40@42½c.
" steamboats, per bbl	65c.
" to manufacturers, per bbl	65c.
" to families	85c.
" shipments, per hhd	$7 00
Anthracite, wholesale, per ton	7@8 00
" retail, "	11 00
Virginia Cannel, retail, per bbl	1 25
Scotch " " "	....
Mt. Carbon, wholesale, per bbl	...
" retail, "	....
St. Bernard wholesale, per bbl	—c.
" steamboat	60c.
" retail "	75c.

Pittston, Pa. March 20, 1877.

Pennsylvania Coal Company's Coal in yard, ton of 2000 lb.

Retail.

Lump, Egg and Stove	$2 25
Chestnut	2 00
Pea	1 00

Delivered, fifty cents per ton additional

Richmond, Va. March 20, 1877

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$6 00	New River Bituminous,	$4 40
Coalburgh Splint	5 70	Clover Hill Coal	3 50
Lewiston "	5 70	James River Bitum	3 50
Kanawha Gas coal	4 90	" " Carbonite,	5 00

San Francisco, Cal.

From the *Commercial Herald*, March 15, 1877.

COAL—Imports from Jan. 1st to March 1:

	Tons.		Tons.
Anthracite	2,529	Mt. Diablo	10,051
Australian	15,473	Vancouver Island	14,875
Coos Bay	4,777	Rocky Mountain	43
Cumberland	4,124	Seattle	15,600
English	8,121	Bellingham Bay	1850

The arrivals of Australian have been light for some time past with very few cargoes now en route. The supplies of Scotch and English have also lessened very materially of late. We clip the following from the Philadelphia *Record* of March 2d: "An important sale of Anthracite Coal appears from our report of the ocean freight market to have been made for shipment from this port to San Francisco. We are told that it is the largest shipment made in several years, and that the purchase has been made by Philadelphia and San Francisco parties who have made arrangements to engage in this trade with the purpose of opening and extending the markets on the Pacific Coast, since Coal has become so cheap as to offer a better margin for shipment than formerly, and ocean freights from the Atlantic to the Pacific Coast so scarce that vessels find it difficult to get cargoes when going to California for wheat. Our inquiries at the offices of a number of the great Coal companies, however, failed to find the sellers of this Coal or any of the particulars, the trade seeming to be entirely ignorant of such a transaction until the facts above stated were communicated by us. It is thought, however, that the Coal will come from some of the companies in the Lehigh region whose product has the reputation of superior quality, as freight on inferior would be equal to that on the best." The item referred to in the above paragraph was a notice of the charter of the American ship *DeCosta* for this port with 2,000 tons of Anthracite at $10 freight. Our local market is now well supplied with Pacific Coast Bituminous. The Mt. Diablo Black Diamond Steam sell at $5 75@7 75 for screenings and coarse respectively; Bellingham Bay and Coos Bay at $8 to dealers. Of Seattle the shipments from the mines in February were 9 401 tons.

St. Louis, Mo. March 20, 1877.

Reported by JAS. J. SYLVESTER, Secretary of the Anthracite Coal Association.

Retail prices, delivered. Ton of 2,000 lb.

ANTHRACITE.

	per ton.		per ton.
Lackawanna	$9 00@10 00	Schuylkill	9 00@10 00
Wilkes-Barre	9 00@10 00	Lehigh	10 00@10 50

BITUMINOUS.

Blossburg	9 00	Big Meadow	3 00
Pittsburg	4 50	Illinois Coals	2 50@3 50
Indiana Block	4 00	Connellsville Coke	8 50

Toledo, Ohio. March 20, 1877.

Specially reported by Messrs. GOSLINE & BARBOUR.

We quote as follows for retail delivery:

Ton of 2,000 lb.

Lackawanna lump	$6 75	Lehigh lump	$7 75
" egg	6 75	" egg	7 75
" stove	7 00	" stove	8 00
" chestnut	6 75	" chestnut	7 75

Soft Coal.

Hocking lump	4 00	Brier Hill	5 75
" nut	4 00	Blossburg	8 00
Willow Bank lump	4 50	Cumberland	8 00
" " nut	4 00		

Hamilton, Ont. March 20, 1876.

Specially reported by H. BARNARD, Dealer in Coal.

Stocks are low, and will all be sold out this season.

Retail, per ton of 2,000 lb.

Grate	$6 00	Smithing	6 00
Egg	6 00	Bituminous retail	6 00
Stove	6 50	" steam	4 00
Nut	6 50	Coke	6 75
Lehigh Lump	6 50		

Montreal, Canada. March 20, 1877.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

Scotch Steam	$5 00	Cape Breton Steam	
Pictou "	4 75	Newcastle Smiths	

Anthracite at retail, per 2000 lb., delivered.

Egg	$6 50	Chestnut	
Stove	7 00		

Toronto, Canada. March 20, 1877.

Scranton and Lackawanna, Grate and Egg	$5 50
" " " Stove	6 00
" " " Chestnut	5 75
Lehigh Lump	7 00
Soft coals (Briar Hill and Massilon) screened for house use	6 00

Freights

Representing the latest actual charters up to March. 22,
Per Ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	....	....	....
Albany	....	....	....	....
Alexandria	....	....	....	....
Amesbury, Mass	....	....	....	....
Bangor, Me	....	....	....	....
Bath, Me	1 45	....	....	1.15-1.25
Baltimore	65	....	....	....
Boston, Mass	1 30@1 50	....	....	*.20-1.25
Bridgeport, Ct	....	....	....	50
Bristol, R. I	....	....	....	80
Brooklyn, N. Y	90	....	...	....
Cambridge, Mass	....	....	....	....
Charleston, S. C.	1 25	....	....	....
Davenport, Mass	1 50†	....	....	....
Fall River	....	....	....	80
Gloucester	....	....	....	....
Greenport, N. Y	1 25	....	....	....
Hartford	....	....	....	....
Hoboken	....	....	....	35
Hudson	....	....	....	....
Jersey City	....	....	....	35
Lynn, Mass	1 65	....	....	1 37†
Middletown	....	....	....	90
Mystic	....	....	....	....
Newark	....	....	....	....
New Bedford	1 25@1 30	....	....	85
Newburyport	....	....	....	1 40
New Haven	‡90	....	....	50
New London	....	....	....	65@70
Newport	....	....	....	80
New York	90	....	....	35
Norfolk	....	....	....	75
Norwalk	....	....	....	50
Norwich	....	....	....	....
Pawtucket	....	....	....	70
Philadelphia	....	....	....	....
Portland	....	....	....	1 25
Portsmouth, N. H.	....	....	....	1 40
Providence	1 25	....	....	80
Poughkeepsie, N. Y.	....	....	....	....
Richmond, Va	65	....	....	....
Rockport, Mass	1 65	....	....	....
Salem, Mass	....	....	....	*.25-1.30
Savannah, Ga	1 50	....	....	..
Stamford	....	....	....	60
Stonington	....	....	....	75
Troy	....	....	....	....
Wareham	....	....	....	....
Washington	80	....	....	....
Weymouth	1 50	....	....	....

*And discharging and towing. †And discharging. ‡And towing. § 3c. per bridge extra.

IRON MARKET REVIEW.

New York

FRIDAY EVENING, March 23, 1877.

American Pig.—The event of the week has been the announcement that the Philadelphia & Reading Coal and Iron Company has sold between 50,000, and 60,000 tons of its iron. The particulars of the transaction are kept private. It is thought by some that English capitalists are the purchasers, and by others that they have only made advances on the iron, while still others think that it is only a transfer of hypotecation, and that New York capitalists have made advances on it. Most of the iron is forge, and those who claim that it has been sold say that the prices received were upon the basis of $15 per ton at Philadelphia. Although it appears to be in a position not to be forced upon the market for what it may bring, yet it still stands as surplus stock and must have a depressing effect upon trade. We note sales of 500 tons of No. 1 foundry iron at Troy at $18.50, but there are circumstances connected with the sale to indicate that the iron was of inferior quality; 1,000 tons of Lehigh forge at a shade ess than $17 at furnace; 100 tons of Crane at $19.50; 200 tons of Allentown No. 1 foundry at $19 prompt cash; and 600 tons of the Thomas Iron Company's forge at $18. The nominal quotations at tide water for the best brands are $20 for No 1 foundry; $19 for No. 2 foundry; and $17.50@$18 for forge. These prices are weak, although sales at lower figures have mostly been for prompt cash.

Scotch Pig.—Sales of 100 tons of Coltness on private terms, and 50 tons of Eglinton at $24.75 are reported. We quote Eglinton at $24.75@$25; Coltness, $26.50; Glengarnock, $26. The number of furnaces in blast in Scotland on the 9th inst. was 119, or the same as a year previous. The stocks in Connal & Co.'s stores was 126,377 tons, or more than double what they were at the corresponding time last year.

Rails.—An exchange of 3,000 tons of steel rails for old rails, on the basis of $49 for the former, and $18 for the latter. both at tide-water, is reported. We also hear of a sale of 360 tons of iron rails, said to be at $35.50 at tide-water. We quote iron rails at mills at $33@$37, and steel rails at $48.50@$50.

Old Rails.—We are reported a sale of 2,000 at $19.

Scrap.—We learn of no business in No. 1 wrought and quote nominally at $19.

Baltimore, Md. March 21, 1877.

Specially reported by Messrs R. C. HOFFMAN & Co.

The iron market shows no indication of any early change. Sales are moderate and prices unchanged. We quote:

Baltimore Charcoal	$29@31	Mottled and White	$16@17 00
Virginia Charcoal	28@32	Charcoal C. B. Blooms	60@62 00
Anthracite No. 1	21@22	" " Belletts	65@67 00
" No. 2	20@21	Refined Blooms	50@52 00
Anthracite No. 3	19@20		

Boston, Mass. March. 17, 1877.

Pig is easy under dispiriting New York accounts of sales of the best brands No. 1 at $19. The Western markets, however, are reported steady, and some of them quite firm. We quote $23 50@24 for No. 1, $23 for No. 2, and $22@23 for gray forge. Scotch pig is dull. We quote Coltness $28, Glengarnock $26 50, and Eglinton $26. The foreign markets continue easy.

Bar is dull, quoting $47@49 for refined, and $38@39 for common. Nails are in light demand. Rails quieted down.—*Commercial Bulletin.*

Buffalo, N. Y. March 22, 1877.

Specially reported by Messrs PALEN & BURNS, 246 Washington Street.

Prices per Gross ton at Buffalo.

ANTHRACITE.

No. 1 Foundry	$23 00@23 50	—4 mos
B 1 "	22 00	—4 "
No. 2 "	21 00	—4 "
Gray Forge	20 50	—4 "

LAKE SUPERIOR CHARCOAL IRONS.

No. 1	$26 75	—4 mos
No. 2	25 75	—4 "
No 3	25 25	—4 "
No. 4	25 25	—4 "
No. 5	25 75	—4 "
No. 6	26 25	—4 "

AMERICAN SCOTCH—CHERRY VALLEY.

No. 1	$25 50	—4 mos.
B 1	24 00	—4 "
No. 2	23 00	—4 "

One dollar off for cash.

Chattanooga, Tenn. March 20, 1877.

Specially reported by J. F. JAMES. pig iron broker, etc., 233 Market Street.

The market here remains in about the same condition as last reported. Sales are equal to the production, principally for southern consumption to meet immediate requirements. Considering the slow progress being made towards the long looked for general reaction in business, the iron trade in this section has little to complain of. Prices remain unchanged.

Tenn. Ala. and Ga. Charcoal,	No. 1 foundry	$20@	22
" " " "	No. 2 foundry	19@	20
" " " "	gray forge foundry	16@	17
" " " coke,	No. 1 foundry	20@	21
" " " "	No. 2 foundry	18@	19
" " " "	gray forge foundry	16@	17
Charcoal or Coke, White and Mottled		15@	—
Tennessee, Alabama and Georgia cold-blast car wheel.		22@	28
Old Rails		18@	19
Old car wheels		16@	17
Wrought Scrap, No. 1		17@	—
" " " 2		12@	—
Cast Scrap		10@	—
Muck Bar		32@	33
Iron Ores.			
Red Hematite (about 55 per cent. metallic iron), f.o.c. et mines		1	25
Brown Hematite (about 25 per cent. metallic iron)		1	75

Cincinnati, Ohio. March 20, 1877.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Our market don't show any new features, the demand is fair, and prices are firm at quotations.

CHARCOAL.

Hanging Rock, No. 1 Foundry	$24 50@25 00	—4 mos	
" No 2, "	24 00@	—4 mos	
" Mill	22 00@23 00	—4 mos	
" Soft Silver Gray	21 00@22 00	—4 mos	
Tennessee, No. 1, Foundry	23 50@24 00	—4 mos	
Tennessee, No. 2, "	22 50@23 00	—4 mos	
" Mill	21 00@22 00	—4 mos	
Missouri, No. 1, Foundry	@	—4 mos	

STONE COAL.

Ohio, No. 1, Foundry	22 50@23 00	—4 mos	
" No. 2, "	21 50@22 0.	—4 mos	
" Soft Silver Grey	21 00@21 50	—4 mos	
Ohio Mill	20 00@21 00	—4 mos	
Missouri, No. 1 Foundry	25 00@	—4 mos	
" No. 2, "	24 00@	—4 mos	
" Mill	21 00@22 00	—4 mos	

CAR-WHEEL.

Hanging Rock, C. B	38 00@43 00	—4 mos	
Tennessee "	28 00@32 00	—4 mos	
Missouri "	30 00@33 00	—4 mos	
Alabama "	28 00@33 00	—4 mos	

BLOOMS.

Charcoal	55 00@ 60 00	—cash

SCRAP IRON.

Cast	50c.@ 90	—cash
Wrought	1 00@1 40	—cash

Cleveland, Ohio. March 20, 1877.

Specially reported by Messrs. C. E. BINGHAM & Co.

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	26 00@	
No. 2, " " "	25 00@	
No. 1, Anthracite	24 00@	
No. 2, "	23 00@	
No. 1, Bituminous	24 00@	
No. 2, "	22 00@	
American Scotch, No. 1, Cherry Valley	24 00@	
" " B—1, " "	23 00@	
" " No. 2, " "	22 00@	
No. 1, Massillon	24 00@	
B—1, "	23 00@	
No. 2, "	22 00@	

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	26 00@	
No. 4 " " "	27 00@	
Nos. 5 and 6 "	27 00@	

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	26 00@	

FORGE IRON.

No. 1, Gray	21 00@	
White and Mottled	19 00@	

Louisville, Ky. March 20, 1877.

Specially reported by Messrs. GEORGE H. HULL & Co.

The market continues firm at full figures. We revise quotations as below.

The usual time, four months, allowed on quotations below.

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$25 00@26 00	
No. 2 " " "	23 00@24 00	
No. 1, Mill, from " "	22 00@22 50	
No. 1. Foundry, from Alabama, Georgia and Tennessee ores	21 00@21 50	
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	23 00@23 50	
No. 1, Mill, from " " " "	21 00@22 00	

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	23 00@23 50	
No. 2, " " " "	21 00@22 00	
No. 1, Mill, " " " "	21 00@22 00	
No. 1, Foundry, from Ala. Ga. and Tenn. Ores.	20 00@20 50	
No. 2, " " " "	19 50@20 00	
No. 1, Mill, " " " "	20 00@23 50	
No. 1 Foundry, from Missouri Ores	24 00@24 50	
No. 2 " " " "	23 00@24 50	
No. 1 Mill, from Missouri Ores	23 00@24 50	

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	37 00@40 00	
" " Tennessee "	26 00@28 00	
" " Alabama and Georgia Ores	28 00@35 00	
" " Kentucky Ores	28 00@40 00	

Milwaukee, Wis. March 20, 1877.

Specially reported by Messrs. R. P ELMORE & Co.

Lake Superior No. 1 Charcoal	$26 00
" " " 2 "	25 00
Lake Superior No. 1 Anthracite	25 00
" " " 2 "	24 00

Pittsburg, Pa. March 20, 1877.

Specially reported by A. H. CHILDS.

No. 1 Foundry	23 00@24	—4 mos
" 2 "	22 00@23	"
Gray Forge	20 00@22	"
White and Mottled	18 00@19	"
Warm blast Charcoal	23 00@29	"
Cold blast Charcoal Western	40 00@45	"

Philadelphia, Pa.

(Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE, COX, JR., & CO., Iron Merchants, 333 Walnut Street, Philadelphia. Week ending March 22, 1877.)

PIG IRON—There is more demand and some few more sales than at our last report. The foundries seem fairly busy, with a better outlook than reported since the new year came in. We have no large sales reported, but many small ones, making in the aggregate quite a business. We report sales of about 4,000 tons all brands, and quote No. 1 $20 to $21; No. 2, $18 to $19.50; gray forge, $17 to $20 as to brand and delivery.

MANUFACTURED IRON—We have a better feeling to report in bars, with some orders, but nothing better as to price; the low prices now ruling seem about a fair quotation. Tank orders are more plentiful, but nothing new as to plate. Skelp is dull, nothing new coming into the market at this time. We quote bars 2·1 to 2·25c. per lb.; tank and plate, 2⅞ to 7c. per lb; skelp, 2¼ to 2¼c. per lb.

RAILS—The demand continues good for steel rails at quoted prices. Nothing new to report in iron; the few small orders coming on the market at this time are eagerly sought for at low prices. We quote steel, $49 to $50; iron, $36 to $40, all at mill.

OLD RAILS—The demand continues for old rails, with higher prices demanded by holders, and about a dollar under quotations continually offered. We quote $20 to $21.50.

OLD WHEELS—The demand for old car wheels is slack, with a plentiful supply. We quote $18 to $20.

SCRAP—Wrought is quoted $22 to $26; cast, $14 to $19.

Richmond, Va. March 19, 1877.

Specially reported by ASA SNYDER, Esq.

Prices of charcoal pig iron remain unchanged. There is very little doing.

Virginia Cold Blast Charcoal Pig Iron		$27 to	$33
" Warm " " " "		24 to	28
" " " Coke " "	1 X	23 to	24
" " " " "	2 X	21 to	22
" " " " "	3	20 to	21
" Anthracite	1 X	— to	—
" "	2 X	— to	—
" "	3	— to	—

St. Louis, Mo. March 20, 1877.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

There is a steady improvement in the condition of our market, the demand being good and prices firm at quotations. Stocks of cheap irons have about disappeared and the market is barren of any grades below our quotations. We quote same as last.

CHARCOAL.	
Missouri No. 1 Found'y.	$23@25
" " 2 "	22@23
" Gray Mill.....	22@23
H. Rock No. 1 Found'y.	25@26
" " 2 "	23½@24
" " Gray Mill.....	23@24
Tenn. No. 1 Foundry	23½@24
" " 2 "	22½@23
" Gray Mill....	22½@23
COKE.	
Alice H. R. Ex No 1 F'y.	26 50
" 1 "	25 50
B, " 1 "	24 50
" 2 "	23 50
Forge	23 50
Chat., Tenn. No. 1 Fd'y.	25 00
" " 2 "	23 50
" " Forge.....	22 50
" " White Mtl'd	21 00

STONE COAL.	
Missouri No. 1 Fd'ry.	25@24
" " 2 "	23@23
" Gray Mill....	22@26
" White & Mt'd	21@22
COLD BLAST CHARCOAL FOR CAR WHEELS.	
All Numbers.	
Hanging Rock..	35@46
Tennessee.....	30@33
Kentucky.....	30@33
Missouri.....	28@30
Georgia.....	28@30
Alabama.....	28@30
Assorted Bar Iron	$2 25, rates.
No. 1 Wrought Scrap	95c. cwt.
Heavy cast "	70 "
Light "	40 "

Montreal, Canada. March 6, 1877.

We quote: Pig Iron.—Gartsherrie, $22.00@22·50; Summerlee & Calder $21.00@21.50; Eglinton & Clyde $19 50@20.00; Hematite $26.00@27.00. Bar, per 100 lbs., Scotch and Staffordshire $2.00@2.10; best do., $2.20@2 30, Swedes and Norway $4.75@$5.50; Lowmoor and Bowling, $6@6.50.—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, Mar. 23 1877.

Although the Presidental question is settled, yet that early and great improvement anticipated by so many has not taken place. There, has been, however, a better business, and all are confirmed in the belief that we have past the lowest point in demand, although they are not decided what course prices may take for several months to come. The business of the past week differs but little from the previous one, with no particular features in any of the articles of this list.

Gold Coin.—During the week under review the price of gold has ranged from 104⅛ to 105,¼ and closed at 104¾.

Bullion.—After our last, silver steadily declined from 54¾d in London to 53¼d advancing again and closing at 53¾d strong to-day. It is not surprising that after so sudden and violent a decline it should have rallied ⅛d per ounce. It is very likely that it may improve still further, but under the causes lately operating (sales by Germany and low rates for India exchange) any very quick return to the ra tes of a few weeks ago is scarcely to be expected. The quotation here is 116¼ per ounce and in San Francisco 9 per cent. di count. Fine gold bars are qu ted at ⅛ to ¼ per cent. premium.

Copper.—There have been sales of about 300,000 lb. at 19¾c.@19⅝c., closing at 19⅜c. to 19½c. The business in this article is as it has been for a long time, manufacturers are only buying from hand to mouth. At the sale in London on the 20th inst., of about 1,000 tons of Wallaroo and Burra Burra copper, the average price received for Wallaroo was £77 3/, or but a fraction under the sale of a month previous. The latest cable quotations from London were Chili bars £70, and best selected £77.

Tin.—624 slabs of Straits, the cargo of the *Calcutta* are reported to have been sold, particulars not learned. Straits in London is lower, being quoted at £71 @ £72. Pending the settlement of troubles in the Straits settlements, the quotations at Penang a re only nominal. We quote here, in gold, as follows: Straits, 16⅞c.@17c.; L. & F., 16½c.; Refined, 16⅛c.; and Banca, 19¼c.@ 19½c.

Tin Plates.—A fair business continues to be done in these although prices are unchanged. We quote, in gold, per box, as follows: Charcoal tins, $6.75@$7, and ternes, $6@$6.25; coke tins, $5.87½@$6, and ternes, $5.50@$5.75.

Messrs. Robert Crooks & Co., of Liverpool, under date of the 8th inst., say of tin plates: "The feeling of this market has been somewhat steadied by the late advices from the United States which show the Presidential election is definitely settled. So far no advance has taken place in prices, but makers exhibit decidedly more reluctance to book for forward delivery. Large enquiries are in the market, and if these are converted into orders, there will be an advance. As matters now shape, further delay in placing orders for early wants is hardly advisable."

Lead.—The sales during the week have aggregated about 100 tons at 6·62¼c,@6·70c.

Spelter and Zinc.—Sales of spelter at as low as 6¼c. are reported, although 6⅜c.@6¾c. are the regular quotations according to brand. Sheet zinc is quiet at 7½c. @8c. currency.

Antimony is quoted at 12¾c. gold, at which price it is quiet.

Quicksilver.—The London price is a little more firm being £7 10/. The San Francisco market quotes at 42½ @43c. gold. The production by the Quicksilver Mining Company during February was 2,500 flasks.

The San Francisco *Commercial Herald* of March 15, says of Quicksilver:—"There continues to be a good demand for export as 42½c. with free sales at this rate; something over 1,200 flasks already secured for the Gaelic to Hongkong at this figure. Some holders are asking more, but this rate tallies with the latest London quotation of £7, but at that figure New York can obtain her supplies cheaper from London than here, although we know of some few hundred flasks recently bought here on New York account at 42½c. to go overland, We copy the following from a late private circular placed in our hands: "It is stated, upon good authority apparently, that the stock of this article in the warehouses at Hongkong on the 1st of February was 11,000 flasks. If to that we add the quantity then afloat from hence and that subsequently shipped, it will give a total of 19,500 flasks. The most careful estimates give the total consumption of this ar icle in China at 1,000 flasks per month. The question is often asked, What becomes of the article in China? and the conviction is becoming more and more general that, like silver, which has for ages been going into Asia, and rarely or never coming out, it is being hoarded. It is a well-known characteristic of the Asiatic to hoard and hide away his surplus wealth, content to keep his principal safe without interest or other gains from it. Hence their hoarding of silver, of precious stones, etc.; and as quicksilver is a high order of metal, approaching in business the precious st nes, and enters la gely into their commercial and industrial relations, it doubtless is looked upon by them as desirable for investment, the same as in the case of silver, precious stones etc. As to the correctness of this theory we have little doubt, from a statement made to us by a party having unusual facilities for knowing, that there were uncovered recently, in one of the towns in India, 16,000 flasks of quicksilver. Assuming the theory as reliable, we have an important factor in our calculations, both as to the disposition of the article and its stability in price."

The Salt Lake City Ore and Metal Market.

Telegraphic advices from Salt Lake City, dated March 23, give the following prices for base bullion and argentiferous lead ores:

No sales are reported; the market is somewhat demoralized owing to the decline in silver.

Argentiferous Lead (Base Bullion).—$73½ per ton for lead. $1.22½ per ounce for silver. $20 per ounce for gold. The quotation for silver is based upon the silver contents in the lead of 70 ounces per ton of 2,000 lb.

A despatch from Salt Lake City, dated the 22d inst., says: "There was quite an excitement here to-day over a discovery yesterday of a silver mining ledge in Red Butte Cañon, about three miles from the city. It is claimed to assay over 300 ounces of silver to the ton. There was quite a stampede to the vicinity of the discovery."

The Colorado *Central City Register* of the 17th inst., publishes the following as the rates paid for silver ores by the Boston & Colorado Smelting Company:

oz. per ton.	cents cy. per oz.	oz. per ton.	cents cy. per oz.	oz. per ton.	cents cy. per oz.
30	30	120	86	225	97
40	43	130	88	250	99
50	55	140	89	300	101
60	63	150	90	350	102
70	70	160	91	400	103
80	75	170	92	500	105
90	78	180	93	6 0	107
100	81	190	94	800	109
110	84	200	95	1000	111

The above scale is based upon a price for fine silver in New York of $1.20 coin per oz., and a premium upon gold of 5 per cent. For a rise or fall in the value of silver, or the premium upon gold, a corresponding difference will be made in the price paid for ore.

Ores in which the value of the gold exceeds the value of the silver are classed as gold ores. For gold contained in silver ore, an allowance is made, based upon its equivalent value in silver. For the copper contents of any gold or siver ores coming under the foregoing schedules $2 will be paid for each per cent., as shown by the dry assay. No charges made for crushing, sampling and assaying ores purchased by this company.

Gold ores will be paid for at the rate of 90 per cent. of the currency value of the gold and silver contents, after deducting $30 per ton for treatment. The gold is taken at $20 (coin) per ounce, the silver at the market quotation in New York, and the premium at two per cent. below the New York quotation. We append the schedule Smelting Works are being established at Rosita Colo.

SILVER QUOTATIONS IN LONDON.

The range for silver in London during the week, per oz., was as under:

March 17.....	54⅛/	March 21.....	53⅜/
" 19.....	54/	" 22	53⅛/
" 20.....	53⅞/	" 23	53¾/

FINANCIAL.

New York Stocks.

NEW YORK, FRIDAY EVENING, March 23, 1877.

The coal shares on this market have been very active during the week, the transactions amounting to nearly 500,000 shares; quotations generally close at the highest prices of the week.

Delaware & Hudson Canal Company.—46,000 shares of this stock have changed hands at from 51¾ to 46¼, closing at 49.

Delaware, Lackawanna & Western Railroad.—About 444,000 shares of this stock have changed at from 60 to 56¼, closing at 58.

New Jersey Central Railroad Stock quotations exhibit but little change, the sales amount to about 7,000 shares. The Chancellor, on March 22, on motion of Leon Abbett, made an order that the receiver of the Central Railroad of New Jersey pay all the workmen their back wages out of the surplus earnings of the road.

The payments are to be made *pro rata* of all wages due prior to February 14, until all are paid off. The receiver will be able to pay about $80,000 this month, and the balance from month to month. The whole amount is about $400,000, and will all be paid in about three months.

At a meeting of the bondholders to-day, which was called by the Receiver, the following resolution was adopted:

Resolved, That Messrs. Robert Lenox Kennedy, President of the National Bank of Commerce, Edwin M. Lewis of Philadelphia, J. Edgar Johnson of Brown, Brothers & Co., John S. Kennedy of J. S. Kennedy & Co., and Theodore Dreier of Naylor & Co., be appointed a committee on behalf of the holders of the bonds of the Central Railroad of New Jersey, secured by the consolidated mortgage, to ascertain and report what steps are most advisable to be taken for the protection of their interests.

Peytona Cannel Coal Company.—The annual meeting of this company will be held on the 3d of April.

Miscellaneous Sales and Quotations.

Sales and quotations of the stocks and bonds dealt in here and at Philadelphia, for the week ending the 23d inst., are given in the following tables. The Philadelphia quotations will have a * affixed.

STOCKS.

	Quotations. High.	Low- est.	Clos- ing.	Sales Shares.
American Coal Co.....	—	—	25	—
*Cambria Iron Co.....	—	—	60	—
*Pennsylvania Salt Manuf. Co.	—	—	68	—
*Shaftou Coal Co.....	—	—	18	8
*Morris Canal Pref.....	—	—	125	7
St. Louis, I. M. & S.....	—	—	*11	—
Spring Mountain Coal.....	—	—	50	—
BONDS.				
D., L & W. 7s, Convt., 1892.....	103¼	—	103½	5,000
" " 2d mtge., 1881.....	—	—	105⅜	—
N. J. C., 1st mtge., new.....	102⅞	101½	102½	24,100
" " 1st mtge., cons.....	53¾	52¼	52¾	25,000
" " Convt.,.....	47½	46⅜	47⅞	15,000
L. & W.-B. Coal Co., cons.....	33	32	33	52,000
Am. Dock & Imp. 7s.	40	—	40	10,000
D. & H. C. Co., 1st m., 1884.....	96	94½	94	19,000
" " " " reg., 1891.....	97	96¼	95½	16,000
" " " " 7s, 1877.....	97	—	97	6,000
" " " " reg. & con., 1894..	92	91	91	13,000
St. L. I. M. & S., 1st mtge.....	98	92½	92	17,000
Ches. & Ohio, 1st mtge.....	—	—	—	—
*L. V. RR., con. mtge., 6s, 1923.	96	95¾	95½	15,000
" " 2d mtge., 7s, 1910..	108¾	107	107	8,000
" " reg. & con., 1898...	107½	—	—	1,000
" " 1st mtge., 6s.....	—	—	—	—
*P. RR., 1st mtge., 1880	104¾	—	—	7,000
" Gen. mtge. reg. 1910.....	108	—	—	4,000
" Con. m. 6s. con. & reg. 1905.	106	—	—	8,000
*P. & R. RR. 7s, 1893	107	—	106	1,000
" " con. m. 7s. con. 1911.	93¼	—	93½	12,000
" " Deb. 6s, 1893	45	—	46	2,000
" " New convt. 7s	50	—	50	45,900
" " Con. mtge. 7s reg...	93½	—	93½	3,000
" " 6s 43-80.....	—	—	101	—
*P. & R. C. & I. Co. Deb. 7s....	60	—	—	1,000
*L. C. & N. Co. 6s. 1834.....	101⅛	—	101½	4,800
" " RR. loan, '97.....	100	—	99½	3,200
" " Con. mtge. 7s ..	—	—	—	—
" " Convt. gold, 1894.	—	—	96	—
" " Gold loan, 1897...	88	87	—	7,500
*Schuylkill Nav., 6s 1897.....	80	—	—	600
*Pa. and N. Y. Canal, 7s	—	—	—	—
Pa. Canal Co.....	70	—	—	1,000
Susquehanna Coal Co. 6s,.....	75	—	—	1,000

Total transactions for the week.....$328,100

Philadelphia Stocks.

PHILADELPHIA, Friday Evening, March 23, 1877.

The transa ctions in coal shares in the Philadelphia stock market during the past week have been fairly maintaintained, and the quotations all close at nearly the highest prices of the week.

Pennsylvania Railroad Company.—The quotations of this stock have ranged from 85 to 81¾ per cent., and closed at 84, the sales aggregating about 110,000 shares.

The Reading Railroad Company is building wharves at Delaware City and shipping coal from there. The transactions in this stock have amounted to about 19,000 shares at from 24¼ to 27¼ per cent., the latter price being the closing quotation.

Lehigh Coal and Navigation Company stock has ranged between 44 and 42 per cent., closing ¼ per cent. below the highest price with sales of 16,000 shares.

Lehigh Valley Railroad Company.—This stock closes at 84 per cent with sales amounting to 3,000 shares. The lowest quotation of this stock for tue week was reached on the 21st inst., when it touched 81¼ per cent. There has been some talk about the amount this company will probably lose on its contract with the Spring Mountain Mines. The L. V. RR. Co. pays as a rental for the mines, 8 per cent. interest on the Spring Mountain Company's capital stock, and then has a contract with Messrs. Hayden & Co. for the mining of coal, the contractors receiving $1.75 per ton, and they can mine, it is said, as much as they please. As the coal should not cost more than $1 per ton, if as much as that, there is a very large margin for profit in the contract. There is a rumor that the company proposes disputing the contract

COAL TRANSPORTATION AND MINING STOCKS.

(New York and Philadelphia.)

	Amount of Cap. Stock.	Shares issued.	Date, percentage and amount of latest dividend.	QUOTATIONS.g																SHARES SOLD.
				Sat.		Mon.		Tues.		Wed.		Thurs.		Fri.		Cl'g.				
				H'gst.	L'st.	H'gst.	L'st.	H'gst.	L'st.	H'gst.	L'st.	H'gst.	L'st.	H'gst.	L'st.	Bid.				
‡Consolidation Coal Co	$10,250,000	102,500	Jan. 1, '77, 2½	....	....	....	....	30	—	....	....	....	....	....	....	....				500
‡Delaware and Hudson Canal Co	20,000,000	202,000	Aug. 1, '76, 4	....	....	....	....	48⅛	47	47⅛	46⅛	49⅛	47⅜	51¾	48½	49⅜	48¼	50¾	49	40	46,000
‡Delaware, Lackawanna and W. RR. Co.	26,200,000	521,000 c	April 20, '76, 2½	60	57¾	58⅛	56¼	58⅜	56⅞	60	57⅜	58	56⅞	59¾	57⅝	58				443,850
§Lehigh Coal and Navigation Co	10,448,550	208,971 c	Sept. 3, '76, 1½	44	43	43⅜	43	43¼	43	43	42	43	42½	....	....	43¾				16,066
§Lehigh Valley RR. Co	27,042,900	540,858 c	Apl. 15, '77, 1½	83½	83	83½	83¼	83½	82¼	82½	81¼	83	83	....	....	84				3,314
‡Maryland Coal Co	4,400,000	44,000	Jan. 31, '76, 1½	10	....	....	....	....	....	9¾	8	....	....	....	....	....				1,000
‡New Jersey Central RR. Co	20,600,000	200,150	Apl. 20, '76, 2½	9	8½	8¾	8½	9⅛	8⅜	9	....	8⅞	....	9⅛	8¾	8⅜				7,440
‡Pennsylvania Coal Co	5,000,000	100,000 c	Feb. 1, '77, 5	....	....	*200	....	....	....	*200	....	....	....	....	....	*200				..
§Pennsylvania RR. Co	68,868,700	1,377,404 c	Feb. 26, '77, 2	85	83¾	84	83	82¾	82	82½	81¾	82¾	82	....	....	84				109,527
§Philadelphia and Reading RR. Co	34,278,755	685,554 c	Jan. 18, '76, 2½	25½	24¾	25¼	25¼	25¼	25	25¼	25	26	25¾	....	....	27¼				18,542

Total sales of Coal Stocks for the week.....646,239

MINING STOCKS,

New York.

Name of Company.	Location.	Feet on Vein.	Capital Stock.	a No. of Shares.	Total Assessments Levied.	Date and Amount of Last Assessment per share.	Total Dividends paid.	Date and Amount of Last Dividend per share.	These quotations are in currency, and in the absence of final bid prices, are based on the latest sales as they occur during the operations of each day.						
									Sat.	Mon.	Tues.	Wed.	Thurs.	Fri.	
Alpha Cons. G. s	Nevada,	300	$ 3,000,000	30,000	$180,000	Aug. 12, '75, $1.	....	.....	$	$	$18 25	$17 75	$	$	900
Belcher, G. s	Nevada,	1,040	19,400,000	104,000	864,400	Feb. 24, '77, $1.	$15,397,200	April 10, '76, $1.	....	....	7 00	7 00	....	....	700
Bertha Gold Co	Virgi'a.	645 acs.	300,000	30,000	**	.....	....	.....	10 12½	9 87½	9 50	9 25	9 37½	9 62½	5,100
Best and Belcher, G. s.	Nevada,	545	10,080 000	100,800	236,992	Feb. 6, '77, $1	....	.....	33 75	33 25	....	....	....	....	200
Bullion, G s	Nevada,	943⅛	10,000,000	100,000	2,202,000	Jan. 15, '77, $1.50.	....	.....	....	17 25	16 50	....	....	14 50	1,0.0
Caledonia, G. s	Nevada,	2,188	10,000,000	100,000	1,310,000	Feb. 10, '77, $1.	....	.....	....	....	....	....	....	....	....
California, G. s	Nevada,	600	54,000,000	540,000	....	.....	11,880,000	Mar. 15, '77, $2.	....	49 62½	48 00	47 62½	....	....	500
Centennial, G	Califor.	66 acres	1,000,000	100,000b	....	.....	....	.....	....	....	....	....	....	....	....
Chollar Potosi, G. s	Nevada,	1,400	2,800,000	28,000	1,282,000	June 26, '76, $5.	3,080,000	Feb. 10, '72, $1.	....	65 50	65 75	....	52 50	52 50	500
Cleveland, G	Colo.	3,715	250,000	25,000b	**	.....	....	.....	5 75	5 87½	6 00	6 00	6 00	6 00	1,500
Cons. Hercules & Roe, s	Colo.	16,500	1,000,000	100,000	**	.....	120,000	.....	....	....	....	....	....	....	.....
Cons. Imperial, G.s	Nevada,	468	50,000,000	500,000	375 000	Mch. 10, '77, 25c.	....	.....	....	1 62½	....	....	....	....	100
Con. N. Slope & E.C.T.	Colo.	15,000	500,000	10,000	**	.....	....	.....	....	....	....	....	....	....	.....
Cons. Virginia, G. s	Nevada,	710	54,000,000	540,000	411,200	June 11, '73, $3.	25,920,000	Dec. 11, '76, $2.	47 50	48 00	47 00	46 50	....	42 00	700
Confidence, G. s	Nevada,	130	2,496,000	24,960	243,840	March 18, '73, $1.	78,000	May 1, '65, $8.33⅓	8 00	8 12½	....	....	7 12½	....	700
Crown Point, G. s	Nevada,	600	10,000,000	100,000	1,273,370	Jan. 10, '77, $1.	11,588,000	Jan. 12, '75, $2.	10 00	10 00	....	....	8 37½	....	1,200
Douglas Mining Co	Colo.	21,000	1,000,000	10,000	**	.....	....	.....	....	....	....	....	....	....	.....
Eureka Cons. G. s. L	Nevada,	..	5,000,000	50,800	100,000	May 26, '76, $1.	1,000,000	Aug. 5, '75, $1.	18 00	....	....	....	17 24	17 75	8 0
Exchequer, G. s	Nevada,	400	10,000,000	100,000	280,000	Sept. 23, '76, $1.	....	.....	....	....	....	6 25	5 50	5 12½	6.0
Gould and Curry, G. s.	Nevada,	621	10,800,000	108,000	2,134,000	Jan. 23, '77, $1.	3,934,800	Oct. 10, '70, $10.	14 12½	....	12 00	....	10 87½	11 50	600
Grant, G. s	Nevada,	1,000	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	.....
Granville Gold Co	N. Car.	9,000	1,000,000	100,000	**	.....	....	.....	2 62½	2 62½	2 50	2 62½	2 50	2 50	2,300
Hale & Norcross, G. s.	Nevada,	400	11,200,000	112,000	2,354,000	Jan. 22, '77, $1.	1,598,000	April 10, '71, $5.	5 37½	5 25	4 75	5 00	4 75	....	2,400
Henry Tunnel Co	Nevada,	3,000	2,000,000	80,000	**	.....	....	.....	....	....	6 25	5 50	5 62½	....	1,350
Hukill, G.s	Colo.	3,288	1,000,000	100,000b	**	.....	20,000	Nov. 1, '76, $1	4 37½	4 37½	4 37½	4 12½	4 12½	4 37½	18,700
Indian Queen, s	Nevada,	1,000	3,000,000	60,000	....	.....	60,000	.....	....	....	....	....	....	....	.....
Julia Cons. G. s	Nevada,	3,000	11,000,000	110,000	220,000	Jan. 4, '77, $1.	....	.....	....	....	....	....	....	....	.....
Justice, G. s	Nevada,	2,100	10,500,000	105,000	1,502,500	Sept. 14, '76, $5.	....	.....	....	....	....	....	....	....	.....
Kentuck, G.s	Nevada,	95	3,000,000	30,000	270,000	Dec. 3, '74, $1.	1,252,000	March 8, '70, $5.	....	....	....	....	....	....	.....
Kossuth, G.s	Nevada,	2,700	5,400,000	108,000c	405,000	Aug. 15, '76, 50c.	....	.....	....	....	....	....	....	....	.....
Leopard, G. s	Nevada,	1,500	5,002,000	50,000	50,000	March 31, '76, $1.	162,500	Dec. 15, '76, 50c.	....	....	....	....	....	....	.....
Lucerne Mining Co	Colo.	4,200	5,000,000	500,000	**	.....	....	.....	....	....	1 50	1 62½	1 62½	1 62½	2,200
‡Mari. L. & M. Co., pre.	Cal.	44387 ac	5,000,000	50,000	1,350,000	Feb. 17, '77, $1.	....	.....	....	....	....	....	....	....	.....
" " " com.	"		10,000,000	100,000	1,350,000	Feb. 17, '77, $1.	....	.....	....	5 00	5 00	....	....	....	.....
Mer. and Min. Tun. Co.	Colo.	30,000	500,000	50,000	**	.....	....	.....	....	....	....	....	....	....	.....
Merrimac, s	Mass.	1,500	500,000	50,000b	**	.....	50,000	March 10, '77, 10c.	6 62½	6 62½	6 75	6 62½	6 25	6 37½	11,310
Mexican, G. s	Nevada,	600	10,080,000	100,800	100,800	Sept. 5, '76, 50c.	....	.....	....	....	....	....	....	14 50	200
Morning Star	Nevada,	1,600	8,000,000	80,000	....	.....	....	.....	....	....	....	....	....	....	.....
Northern Belle, s	Nevada,	1,600	5,000,000	50,000	....	.....	1,100,000	March 12, '77, $1.	....	....	....	....	....	....	.....
Ophir, G. s	Nevada,	675	10,080,000	100,800	2,034,400	May 14, '75, $2.	1,394,400	March 9, '64, $4.	....	....	....	27 50	....	....	200
Original Comstock, G.s.	Nevada,	....	10,000,000	10,000	....	.....	....	.....	....	....	....	22 37½	21 12½	20 50	400
Overman, G. s	Nevada,	1,200	3,840,000	38,400b	2,222,280	Oct. 21, '76, $3.	....	.....	....	....	....	....	....	....	.....
Pleasant View, G	Colo.	1,200	200,000	20,000b	**	.....	....	.....	....	....	....	....	62 50	....	200
‡Quicksilv. M.Co., pre.	Cal.	8500 acs.	4,291,300	100,000	**	.....	....	.....	....	22 00	23 25	....	....	21 00	300
" " " com.	"	"	5,708,700	"	**	.....	....	.....	15 87½	15 75	16 00	....	....	15 87½	1,000
Raymond and Ely, G. s.	Nevada,	5,000	3,000,000	30,000	540,000	Dec. 5, '76, $1.	3,075,000	Sept. 10, '73, $3.	....	....	....	4 75	....	....	300
St. Joseph Lead Co. L	Missou.	2600 acs.	1,000,000	100,000	....	.....	250,000	.....	....	....	....	....	....	....	.....
Santiago, G. s	Nevada,	2,000	11,200,000	112,000	....	.....	....	.....	....	....	....	....	....	....	.....
Savage, G.s	Nevada,	800	11,200,000	112,000	2,970,000	Jan. 27, '77, $1	4,460,000	June 11, '69, $3.	....	....	....	6 87½	6 50	....	300
Seaton, G. s	Colo.	1,700	500,000	50,000	**	.....	....	.....	5 00	4 87½	....	4 25	4 37½	4 50	6,725
Seg. Belcher, G.s	Nevada,	160	640,000	6,400	244,800	April 11, '76, $5.	....	.....	....	....	....	....	....	....	.....
Sierra Nevada, G. s	Nevada,	3,650	10,000,000	100,000	1,600,000	Feb. 15, '77, $1.	102,500	Jan. 16, '71, $1.	....	....	....	....	....	....	.....
Silver City, G. s	Nevada,	3,900	6,310,000	63,100	15,775	Nov. 16, '76, 25c.	....	.....	....	....	....	....	....	....	.....
Silver Hill, G. s	Nevada,	5,400	10,800,000	108,000	864,000	Feb. 6, '77, $1.	....	.....	....	....	....	....	....	....	.....
South Comstock, G. s.	Nevada,	1,500	10,000,000	100,000	54,000	Jan. 30, '77, 25c.	....	.....	....	....	....	....	....	....	.....
South. California, G. s	Nevada,	1,500	5,000,000	50,000	....	.....	....	.....	....	....	....	....	....	....	.....
Southern Star, G. s	Nevada,	1,500	6,000,000	600,000	....	.....	....	.....	....	....	....	....	....	....	.....
Trenton, G. s.	Nevada,	..	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	.....
Union Cons. G. s	Nevada,	850	10,000,000	100,000	260,000	March 3, '76, $1.	....	.....	....	....	....	....	....	....	.....
West Belcher, G. s	Nevada,	1,000	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	.....
Yellow Jacket, G. s	Nevada,	1,200	12,000,000	120,000	2,838,000	March 2, '77, $1.	2,184,000	Aug. 10, '71, $2.50.	....	....	....	....	....	....	.....
Young America, s	Nevada,	1,000	3,000,000	30,000	6,000	Oct. 23, '76, 20c.	....	.....	....	....	....	....	....	....	.....

Total Assessments levied to date, $32,054,357 | Div'ds pd. to date, $88,706,400 | Total sales of Mining Shares for the week..... 63,037

Boston.

									Fri.	Sat.	Mon.	Tues.	Wed.	Thurs.	
Allouez, C	Mich.	..	$1,000,000	20,000c	$940,000	May 9, '76, $5.	....	.....	$8 00	7 50	7 00	8 co	7 00	7 00	.....
Calumet and Hecla, C	Mich.	2¾ mile	2,000,000	80,000d	1,200,00c	.....	$11,450,000	Feb. 15, '77, $5.	180 00	180 00	179 00	178 50	179 00	179 75	.....
Central, C	Mich.	..	500,000	20,000c	100,000	June, '62, 65c.	1,160,000	Feb. 6, '77, $7.	33 50	33 62½	33 50	33 25	33 75	34 00	.....
Copper Falls, C.	Mich.	..	1,000,000	20,000d	535,00c	May 10, '76,	100,000	Nov., '71, $1.	3 25	2 87½	2 75	2 87½	3 12½	3 00	.....
Dana, C	Mich.	..	500,000	20,000d	68,00c	Jan., '73, 50c.	....	.....	10	10	10	10	10	10	.....
Dawson, s	Canada.	..	1,200,000	60,000f	....	.....	.. ..	.....	13	13	14	14	14	13	.....
Duncan, s	Canada.	..	1,200,000	60,000f	75,000	July, '76, 41⅔.	....	.....	5 75	5 81¼	5 75	5 87½	5 75	5 75	.....
Franklin, C	Mich.	..	500,000	20,000d	360,00c	June, '68, $5.	585,000	Nov., '71, $1.	11 25	11 37½	11 25	11 21½	11 25	11 25	.....
Humboldt, C	Mich.	..	500,000	20,000d	100,00c	Sept. 28, '76, 15c.	....	.....	20	20	20	20	20	20	.....
International, s	Canada.	..	1,200,000	60,000f	....	.....	....	.....	50	50	50	50	50	56¼	.....
Madison, C	Mich.	..	500,000	20,000d	123,000	Sept. 11, '74, 10c.	....	.....	25	25	25	25	25	25	.....
Mesnard, C	Mich.	..	500,000	20,000d	160,000	April 12, '65, 50c.	....	.....	38	40	40	40	40	40	.....
Minesota, C	Mich.	..	1,000,000	20,000c	436,000	June 10, '69, $1.	1,820,000	Mch. 15, '76, 50c.	1 37½	1 37½	1 25	1 37½	1 37½	1 37½	.....
National, C	Mich.	..	500,000	20,000e	195,000	Oct., '75, $1.	360,000	Oct., '73, $1.	1 12½	1 06¼	1 06¼	1 00	1 00	1 co	.....
Osceola, C	Mich.	..	1,000,000	40,000d	820,00c	May 1, '76, $2.	....	.....	20 50	20 75	21 00	22 00	21 50	22 25	.....
Petherick, C	Mich.	..	500,000	20,000d	165,533	March 22, '76, 50c.	....	.....	25	25	25	25	25	25	.....
Pewabic, C	Mich.	..	500,000	20,000d	185,00c	June, '68, $3.	460,000	July, '73, $1.	3 75	3 62½	3 62½	3 50	3 62½	3 37½	.....
Phœnix, C	Mich.	..	1,000,000	20,000d	817,500	Sept., '70, $3.	20,000	Jan 20, '76, $1.	....	....	....	....	....	....	.....
Quincy, C	Mich.	..	h 200,000	20,000b	....	.....	2,130,000	Feb. 15, '77, $4.	40 50	40 50	40 75	40 50	40 00	40 00	.....
Ridge, C	Mich.	..	500,000	20,000d	200,000	.....	90,000	Feb. 8, '75, $1.	3 50	3 62½	3 50	3 62½	3 50	3 25	.....
Rockland, C	Mich.	..	500,000	20,000d	495,000	Jan., '74, $1.	....	.....	25	25	25	25	25	25	.....
Star, C	Mich.	..	500,000	20,000i	265,000	March 30, '76, 50c.	....	.....	30	28	28	25	25	25	.....
Superior C	Mich.	..	500,000	20,000d	340,000	March, '74, 25c.	....	.....	10	10	10	10	10	10	.....

Total Assessments levied to date, $7,640,033 | Div'ds paid to date, $18,175,000 | Total sales ..... —— shares

G. Gold. S. Silver. L. Lead. C. Copper. a The par value of shares is $100, unless otherwise designated. b Par value $10. c Par value $50. d Par value $25 each. e Par value $15. f Par value $20. g Quotations represent the latest prices bid. Prices asked will have a * affixed. For readines of comparison the quotations of Philadelphia Stocks the shares being $50 each, are based upon a percentage value, or 100, equal to shares of $100. h Full paid. i On the four old companies. † This company declared a dividend of 3½ per cent. on its pref rred stock in July, 1876. ‡ New York Stock Exchange quotations. § Philadelphia Stock Exchange quotations. ** Non-assessable.

on some legal grounnd, and in the mean time the matter is receiving much public attention.

United New Jersey Railroad and Canal Company.—This Company announces a dividend of 2½ per cent, payable at the office of the Pennsylvania Railroad Company on the 10th of April.

Penn. Gas Coal Co.—10 shares of this stock were sold at auction during the week at $160 per share.

Shamokin Valley and Pottsville Railroad Co.—$2,000 of the 7 per cent bonds of this Company were sold at auction during the week at 95 per cent.

Pennsylvania Canal Co.—$5,000 of the 6 per cent. bonds of this Company, due in 1910, were sold at auction during the week at 70 per cent.

Westmoreland Coal Co.—The annual meeting of this Company will be held on the 4 th of April.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING March 22, 1877.

The market on copper is as dull as it is possible to be with anything doing at all. We note a sale of 25 shares of Allouez on the 21st at $8, the first public sale for months. Calumet holds steady at 179¾ with an occasional sale at 180. Copper Falls has been a little active selling at 3, then offered at 3, sales later at 3¼ and closes at 3 to 3¼. Duncan has been remarkably quiet, hardly a sale for the week. There has been some demand for International, and some 1,000 shares has changed hands at 56¼c. Osceola has jumped two points, and closes 22¼ bid. Pewabic has declined to 3⅝. Quincy steady at 40 bid, with a few sales at 40¼. In the others nothing doing.

Gold and Silver Stocks.

NEW YORK, FRIDAY EVENING, Mar. 23, 1877.

The business of the week under review has been somewhat quiet, the sales aggregating but 61,735 shares as compared with 124,055 shares last week. The stocks receiving the most attention have been Hukill, Merrimac, Seaton and Bertha, in the order mentioned. Prices are generally weaker. This was brought about by some operators overloading in Seaton and Hukill, and being compelled to realize generally to meet their obligations. The experience of the board in new stocks has been that there were representatives at their backs to steadily advance the quotations, regardless of the merits of the mines represented. The owners of Seaton and Hukill, however, could see no permanent profit in this mode of doing business, and left the stocks to stand upon their own merits, much to the disappointment of some operators who had anticipated re-selling to the original owners in a few days at a profit of one or two per cent.

Hukill has ranged from 4⅜ to 4⅞ regular closing at 4¼ regular. The transactions for the week have been 18,700 shares.

Merrimac.—The transactions in Merrimac have aggregating for the week 11,310 shares. The range of prices has been from 6⅞ to 6¼ closing at 6⅜.

Seaton sold from 5 on the 17th inst. down to 4¼ on the 21st steadily advancing to 4⅛ at the close, with sales aggregating for the week 6,725 shares.

Bertha opened at 10⅛, steadily declining to 9¼ yesterday, and since recovering to 9⅝. The transactions for the week amount to 5,100 shares.

The Davis Smelting Works located at Butte Montana, shipped to Helena during the week ending the 3d inst., crude bullion, averaging 950 fine, amounting to $8,500. This was the product of a lot of extremely low grade ore being unassorted and principally surface rock taken from the Lexington lead.

The Grand Prize Silver Mine located in the Tuscarora District, Nevada, produced about $40,000 in bullion during the month of February.

The Leeds Silver Mine, located at Silver Reef, Nevada, is producing bullion at the rate of about $40,000 per month.

The Chollar Potosi Mine shipped $101,761 in bullion on the February account.

The St. Lawrence Gold Mine located in Placer County, Cal., a bullion product of $24,275 from a recent run of 25 days, the ore averaging $92 per ton.

The St. Joseph Mo. Lead Company announces a dividend of 2 per cent. equal to $20,000. This makes $250,000 which this Company has paid to its stock holders.

The Ontario Silver Mine of Utah. shipped $31,230 in bullion, from March 1st. to 10th inclusive. It is anticipated that the product of this mine for this month will exceed that of any previous month.

The Crismon Mammoth Gold Mine of Utah gave a bullion product of $4,000 during the operations of the first ten days of the present month.

The Merrimac Silver Mining Company. has struck a vein of gray copper south of their shaft, the richest one yet discovered, assaying it is stated as high as $6,000 per ton.

The Bobtail Gold Mining Company.—The January product of this company from stamp ore was 850 ounces of gold, and for the month of February 908 ounces equal to a total currency value of about $28.759.

Hale and Norcross Gold and Silver Mining Company.—At the recent annual meeting of this Company in San Francisco the following statement of receipts and expenditures was submitted. The total receipts for the year were $579,725.78 the main items of which were: From assessments, $567,890 (which includes a balance of $78,550 from assessment No. 49. of the previous fiscal year) miscellaneous sources. $3,695.52; Nevada Bank, $7.537.34. The principal items of disbursements were: Construction account, $283,048. 31; mine account, $131,714.30; Chollar-Norcross-Savage shaft, $86,110 04; general expenses, taxes and minor items making up the balance of expenses, which amounted to $579,-724 80.

James G. Fair, the retiring superintendent, submitted the following report: Since my last report the energies of the Hale & Norcross Company have been applied to the freeing of the mine of water, then nearly up to the 1,700-feet level. During the year heavy and expensive machinery has been erected, which is now in successful operation, and the water has been lowered fifty-four feet below the 1,900-feet level, with the prospect of the mine being entirely freed from overflow in a short time, as the combined pumps of the Savage and Hale & Norcross have no difficulty in lowering it as against its present pressure or head; showing that its principal source of supply has been lessened. The drift connecting the Savage and the Hale & Norcross on the 1,900-feet level has been cleaned out and repaired its entire length, which gives a free and perfect ventilation at that depth, and will facilitate the work of opening the mine at that point. With the mine free from water, prospecting on the 2,200-feet level and in the winze below that level will be resumed, where the work done over a year ago promisod a change for the better.

Consolidated Virginia.—The reports of gentlemen from San Francisco who recently examined the 1,650-feet level are very favorable. The lode is said to be even larger than in the 1,550-feet level and the ore to be richer, Stoping will shortly be resumed, and this company is expected to recommence paying monthly dividends in May.

California.—This mine is said to be looking very well and the bonanza is said to hold its strength at every point.

The following were the sales at the New York Mining Stock Exchange during the week, omitting those stocks which are quoted on the American Mining Stock Exchange. This Board now occupies the Government Bond room of the New York Stock Exchange:

Lacrosse Gold Mining Company, 75,000 shares at from 29c. to 32c. per share.

New York and Colorado Gold Mining Company, 100 shares at $1.75.

American Flag Gold Mining Company, 100 shares at 8c.

Bobtail Tunnel Company, 50 shares at $3.50.

Atlantic Copper Mining Company, 1,000 shares at from $7 to $7.25.

Calumet & Hecla Copper Mining Company, 8 shares at $180.

Central Copper Mining Company, 50 shares at $37.

Quincy Copper Mining Company, 50 shares at $40.

Bobtail Gold Mining Company, 1,350 shares at $1.45 to $1.55 per share.

Closing quotations to-day are as follows:

	Bid.	Asked.
Smith & Parmlee	10	....
Lacrosse Gold Mining Co.	28	29
New York & Colorado Gold Mining Co.	1 50	4 00
American Flag Gold Mining Co.	7	..
Bobtail Gold Mining Co.	1 40	1 50
Atlantic Copper Mining Co.	6 75	7 50
Calumet & Hecla Copper Mining Co.	179 00	182 00
Central " "	34 00	38 00
Quincy " "	39 00	40 50

Gas Stocks.

NEW YORK, FRIDAY EVENING, March 23, 1877.

Gas stocks are very quiet and with a single exception, the quotations remain as given in our last.

The Cumberland (Md.) Gas Difficulty.—At the meeting of the Cumberland Common Council on the 20th inst. the committee on gas and lamp-posts reported in favor of requesting the gas company to reduce the price of gas from $30 to $24 a year for each lamp-post, but after a great deal of discussion the report was rejected and the committe instructed to notify the gas company that $18 a year for each post was all the city was willing to pay, and if gas was not furnished at that rate, it would be discontinued. Only three members voted against this instruction. It is expected that the company will turn off the city supply on the 1st proximo.

The St. Louis Gas Difficulty.—Two motions, which had been pending in the Circuit Court for several days past, asking for new trials in the case of the city of St. Louis against the St. Louis Gaslight Company, were overruled by Judge Gottschalk on the 20th inst.

Montreal Gas Co.—We note recent sales of about 1,400 shares of the stock of this Company, at from 157½ to 159¼ per share.

The Darby, Pa., Gas Works were sold at auction in Philadelphia on the 20th inst. for $4,000. The works originally cost $18,000, and it is stated were yielding a surplus over all expenses.

Northern Liberties Gas Co.—21 shares of this stock was sold at auction in Philadelphia during the week at $43 per share.

Halifax, N.S., Gas Light Co.—This Company has declared a dividend of 5 per cent., or $2 per share, out of the profits of its gas business for the half year ending January 31, 1877.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Companies in New York and Vicinity.	Cap. Stk.	Par.	last Div'd.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.	$5,000,000	$ 100	2½	Jan. '77	103	104
" " Bonds	90,000	1,000	†3½	Feb. '77		107
NewYork, "	4,000,000		5	Nov. '76	130	134½
Metropol. "	2,500,000	100	5	Sep. '76	140	144
" " Certf.	1,000,000	....	3½	" "	102	—
" " Bonds	500,000	1,000	3½	Dec. "		102½
Harlem "	1.850,000	50	4	Feb. '77	104	—
Manhattan"	4,000,000	50	10	Dec. "	218	221
Brooklyn, B'klyn.	2,000,000	25	5	Nov. '76	168	172
Nassau "	1,000,000	25	4	Jan. '76	80	—
" " Certf.	700,000	1,000	3½	Nov. '76	95	—
People's "	1,000,000	10	3½	Jan. '76	47	52
" " Certf.	300,000	1,000	3½	July '76	84	90
" " Bds	325,000	....	3	Feb. '77	90	96
Metropol. "	1,000,000	10	3½	Nov. '76	78	80
Wmsburgh "	1,000,000	50	3	Oct. '76	130	—
" " Certf.	1,000,000	....	3½	July "	100	102
Citizen's "	1,200,000	20	2½	Jan. '76	95	99
" " Certf.	320,000	1,000	3½	Oct. "	98	102
J. C. N.J.	750,000	20	5	July,'75	160	—
Centl. Westch. N.Y.	466,000	50	4	July. "	50	—
Subur'n " "	295,000	50	3½	Oct.1,'76	50	100

† Gold.

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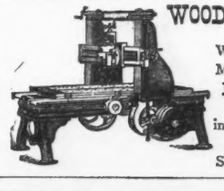

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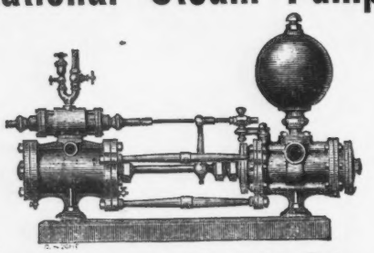

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